Appendix E2

BIOLOGICAL EVALUATION

Activities Related to

Wildlife Habitat, Forest Management, and Roads

Paint Creek Project

USDA-Forest Service
Cherokee National Forest
Watauga Ranger District
Carter County, Tennessee

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1.0 INTRODUCTION

The purpose of this biological evaluation (BE) is to document any potential effects of the project on sensitive species or their habitat, and to ensure land management decisions are made with the benefit of such knowledge. The Forest Service has set forth guidance in FSM 2670 which is designed to ensure that Forest Service actions (1) do not contribute to the loss of viability of any native or desired non-native species or cause a trend toward federal listing for any species; (2) provide a process and standard which ensures that sensitive species receive full consideration in the decision making process.

1.1 AFFECTED AREA AND SCOPE OF ANALYSIS

Approximately 16,032 acres of Forest Service Land occurs in the watershed. Aquatic habitats in the affected areas include coldwater streams in the Paint Creek and Back Creek watersheds. Elevations of affected areas range from 1,920 to 3,920 feet MSL. No northern hardwood forests occur in or near any affected areas. Table 1 lists the terrestrial habitats available in the project area.

TABLE 1. TERRESTRIAL HABITATS OF THE PAINT CREEK ANALYSIS AREA

Major Forest Communities	**Acres**	**Percent of Area**
Mesic deciduous (MDF)	7,464	47%
Eastern Hemlock/White Pine (EHWP)	1081	7%
Oak & oak-pine (OOPF)	8,560	53%
Pine & Pine/Hardwood (PPHW)	1,835	11%
Successional Habitats	**Acres**	**Percent of Area**
Early successional (ESF)*	254	2%
Sapling/pole (SPF)	1,826	11%
Mid-successional (MSF)	1,271	8%
Late-successional & old growth (LSOG)	12,592	79%
Other Terrestrial Habitats	**Acres**	**Percent of Area**
Permanent openings (PO)	164	1%
High elevation shrubby habitats (HESH)	22	0%
Snags, dens, downed wood (SDDW)	13,863	86%

The **scope of analysis** for available habitat, direct effects, and indirect effects on Sensitive species includes the Paint Creek watershed of Greene County, Tennessee. The affected area includes portions of Compartments 205, 206, 207, 209, 210, 213-219, 223, 262, and 264. The timeframe considered for cumulative effects is the past five years to the future five years, as recommended by the US Fish and Wildlife Service. Activities considered in cumulative effects analysis are listed in Table 2. Viability of each species across the entire Cherokee National Forest (CNF) is also considered in making the Determination of Effect.

TABLE 2. ACTIVITIES CONSIDERED IN CUMULATIVE EFFECTS ANALYSIS

Activity	Acres	Past 5 years	Future 5 Years
Henry Ridge Prescribed Burn	28	Yes	No
Phillips Hollow Prescribed Burn	15	Yes	No
Bellcow Mountain Prescribed Burn	1,818	No	Yes
Paint Creek Hemlock Treatments	10	Yes	Yes
Hurricane Gap Hemlock Treatments	1	Yes	Yes
Ricker Mountain Hemlock Treatments	1	Yes	Yes
Wildfires/Floods	unknown	Yes	Yes

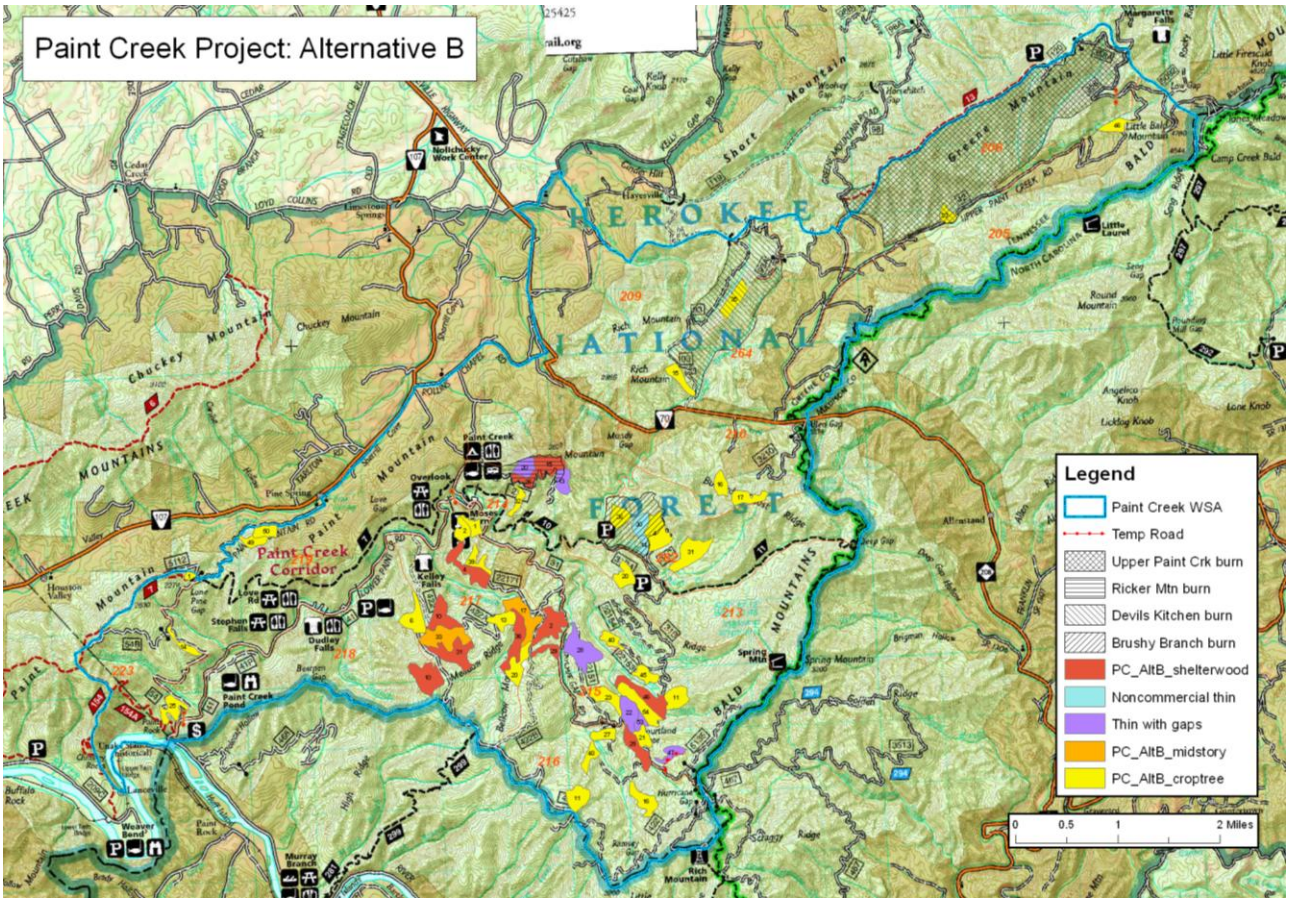
1.2 PROPOSED ALTERNATIVES

ALTERNATIVE A (NO ACTION)

No projects would be implemented in the project area at this time. Current uses of the area would continue until such uses were prohibited by changed environmental conditions. Selection of Alternative A does not preclude future analysis or implementation of on-going management proposals within the project area.

ALTERNATIVE B

FIGURE 1. ALTERNATIVE B MAP



Activities proposed are shown in Figure 1 and listed in Table 3. Refer to *Paint Creek Environmental Assessment, Chapter 2* for detailed list of stands to be treated.

TABLE 3. PROPOSED ACTIVITIES IN ALTERNATIVE B

Action	**Habitat**	**Successional Stage**	**# Stands**	**Area**
Early Successional Habitat	Deciduous & White Pine Forests	Sapling/Pole to Late	17	377 acres
Thinning	Deciduous and Pine Forests	Late	8	152 acres
Pre-Harvest Site Preparation	Deciduous and Pine Forests	Sapling/Pole to Late	25	529 acres
Post-Harvest Treatments	Deciduous and Pine Forests	Early	25	529 acres
Tree planting	Deciduous and Pine Forests	Early	17	377 acres
Crop Tree Release	Deciduous and Pine Forests	Early to Sapling/Pole	30	643 acres
Midstory	Deciduous & White Pine Forests	Sapling/Pole to Late	2	95 acres
Prescribed burns	Deciduous and Pine Forests	Sapling/Pole to Late	3 areas	735 acres
Wetland Improvement	Wetland	Early	-	2 acres
Nest/Roost Boxes	Deciduous & White Pine Forests	Early	23	34 boxes
Waterholes	Deciduous Forest/Openings	Early	5	5 ponds
Grouse Drumming Logs	Deciduous Forests	-	-	85 logs
Road Maintenance/Reconstruct	Deciduous and Pine Forests	Mixed	-	11.5 miles
Temporary Road Construction	Deciduous and Pine Forests	Mixed	-	0.3 miles
Road Decommission	Mixed Forest & Water Crossings	Mixed	-	3.7 miles
Authorize Existing Roads	-	-	-	8.3 miles

Early successional habitat (ESH) would be created using commercial timber harvest (shelterwood and gaps) and non-commercial regeneration. An average basal area (BA) of 15-25 ft^2/acre of shelterwood reserve trees would be left on site to create a two-aged stand structure along with new regeneration.

Thinning would leave a BA of 35-60 ft^2/acre. Gaps up to 2 acres in size would be created for ESH. Damaged and disease trees would be removed first, then scarlet and black oak, red maple, and white pine.

Reserve trees in both treatment types would include dens, large mast producing trees, and yellow pines. All early successional and thinned stands would require pre- and post-harvest treatments:

- Pre-harvest site preparation: Midstory species would be controlled with herbicide (Imazapyr and Glyphosate) to reduce post-harvest sprouting of overly-competitive species.
- Post-harvest treatments: One-two years after harvest, use chainsaw slashdown or herbicide (Imazapyr and Glyphosate), and two-four years after harvest, use herbicide (Triclopyr) to reduce competitive sprouts.
- Mast tree seedling plantings (*Early Successional Only*): Seedlings of mast-producing tree species would be planted in regenerated areas to augment natural reproduction.

Crop tree release around selected mast-producing trees would be implemented using chainsaws.

Midstory treatments with herbicide (Imazapyr and Glyphosate) would reduce the stocking density of understory and midstory trees by 25%.

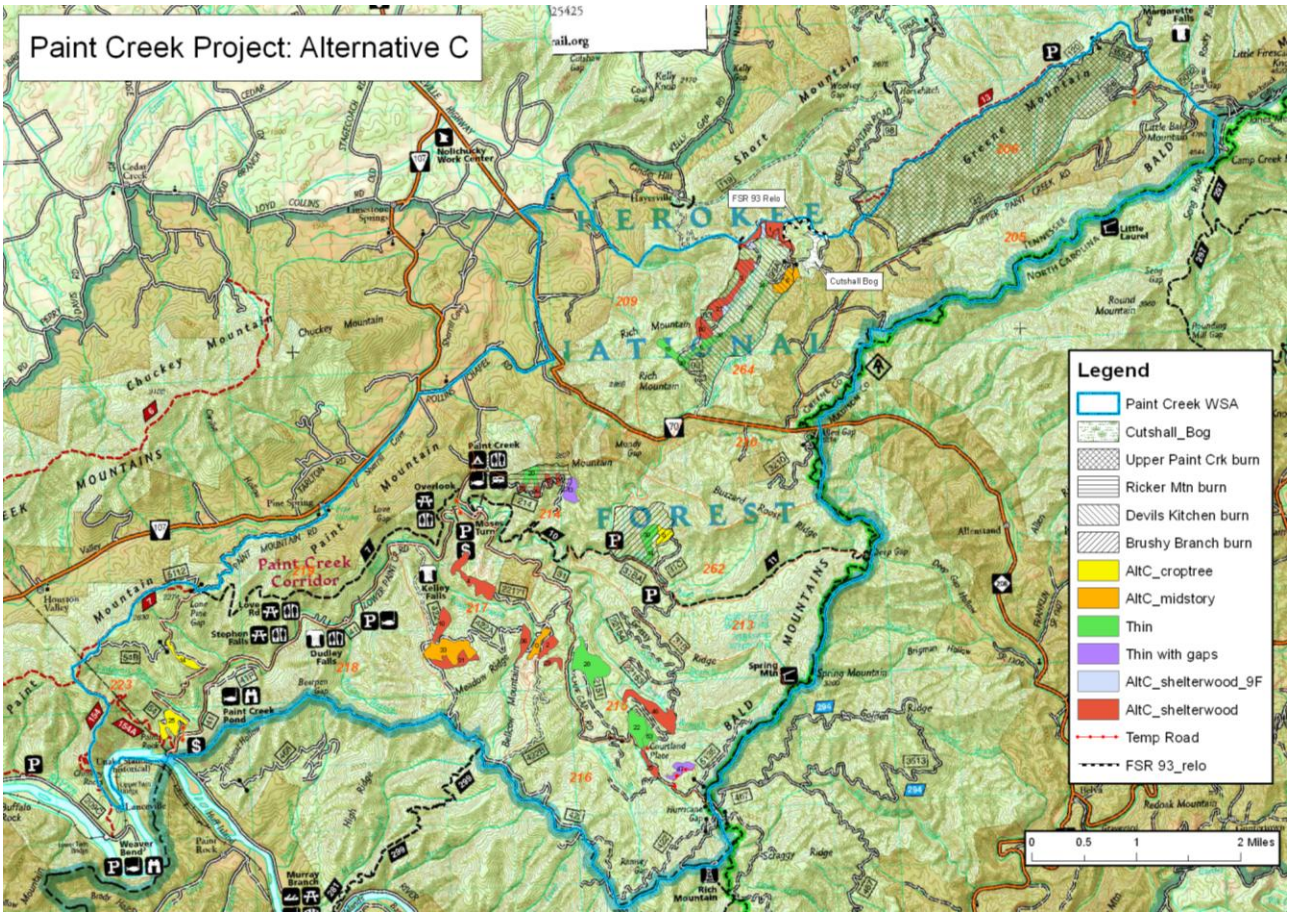
Prescribed burns (low-intensity) would be conducted using existing roads, streams, dozer and hand tools for control lines. If the burn objectives were not fully met, a follow-up burn would be conducted and may continue on a two to ten-year rotation.

Wildlife Habitat Improvements after harvest would include bat roost and nest boxes; vernal ponds (waterholes); and grouse drumming logs. **Wetland improvements** would include thinning trees and rhododendron at Allen Gap to reduce shading of rare wetland plants.

Maintain existing roads and construct temporary roads: Existing roads would be maintained, and temporary roads would be constructed in support of timber sale activities. Temporary roads would be closed after the timber sale. **Decommission roads**, both authorized and unauthorized, identified in the Paint Creek Transportation Analysis Plan. **Authorize roads** that are existing but not in the Forest Service system.

ALTERNATIVE C

FIGURE 2. ALTERNATIVE C MAP



Activities proposed are shown in Figure 2 and listed in Table 4. Refer to *Paint Creek Environmental Assessment, Chapter 2* for detailed list of stands to be treated. Activities described in Alternative B would be the same as in Alternative C. The following activities would be in addition to those mentioned previously.

Wetland Restoration would include removing decommissioned road and controlling encroaching woody plants with chainsaws and/or aquatic approved herbicide (glyphosate) at Cutshall Bog; thinning trees and rhododendron at Allen Gap to reduce shading of rare wetland plants.

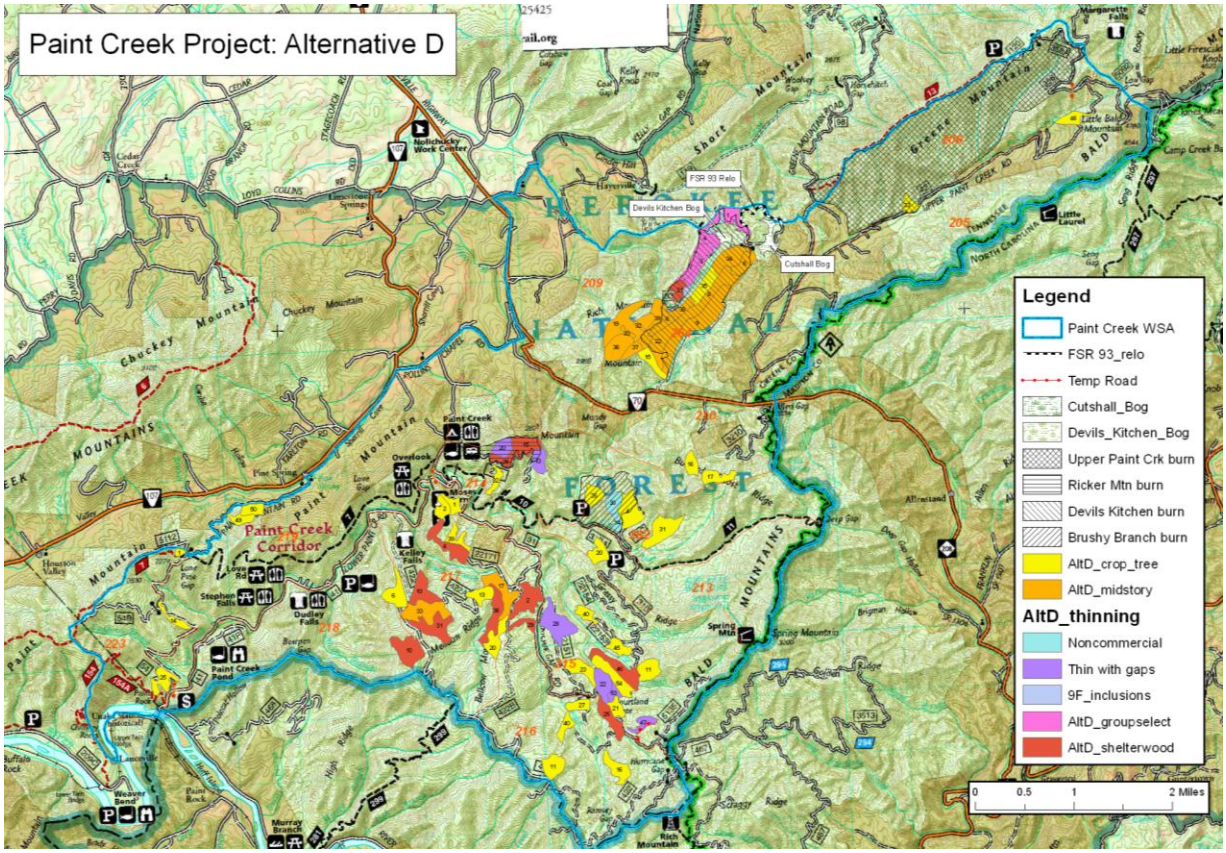
TABLE 4. PROPOSED ACTIVITIES IN ALTERNATIVE C

Action	Habitat	Successional Stage	# Stands	Area
Early Successional Habitat	Deciduous & White Pine Forests	Sapling/Pole to Late	21	287 acres
Thinning	Deciduous and Pine Forests	Late	16	203 acres
Pre-Harvest Site Preparation	Deciduous and Pine Forests	Sapling/Pole to Late	37	490 acres
Post-Harvest Treatments	Deciduous and Pine Forests	Early	37	490 acres
Tree planting	Deciduous and Pine Forests	Early	21	287 acres
Crop Tree Release	Deciduous and Pine Forests	Early to Sapling/Pole	3	49 acres
Midstory	Deciduous & White Pine Forests	Sapling/Pole to Late	3	84 acres
Prescribed burns	Deciduous and Pine Forests	Sapling/Pole to Late	4 areas	1,955 ac.
Wetland Restoration	Wetland	Early	2 areas	25 acres

Nest/Roost Boxes	Deciduous & White Pine Forests	Early	23	34 boxes
Waterholes	Deciduous Forest/Openings	Early	5	5 ponds
Grouse Drumming Logs	Deciduous Forests	-	-	85 logs
Road Maintenance/Reconstruct	Deciduous and Pine Forests	Mixed	-	17.2 miles
Temp & FS Road Construction	Deciduous and Pine Forests	Mixed	-	1.3 miles
Road Decommission	Mixed Forest & Water Crossings	Mixed	-	4.7 miles
Authorize Existing Roads	-	-	-	8.3 miles

ALTERNATIVE D

FIGURE 3. ALTERNATIVE D MAP



Activities proposed are shown in Figure 3 and listed in Table 5. Refer to *Paint Creek Environmental Assessment, Chapter 2* for detailed list of stands to be treated. Activities described in Alternative B would be the same as in Alternative D. The following activities would be in addition to those mentioned previously.

Wetland Restoration would include removing decommissioned road at Cutshall Bog; controlling encroaching woody plants with chainsaws and aquatic approved herbicide (glyphosate) at Cutshall Bog, Devil's Kitchen Bog, and Rough Branch Beaver Pond; thinning trees and rhododendron at Allen Gap to reduce shading of rare wetland plants.

TABLE 4. PROPOSED ACTIVITIES IN ALTERNATIVE D

Action	Habitat	Successional Stage	# Stands	Area

Early Successional Habitat	Deciduous & White Pine Forests	Sapling/Pole to Late	18	398 acres
Thinning	Deciduous and Pine Forests	Late	8	152 acres
Pre-Harvest Site Preparation	Deciduous and Pine Forests	Sapling/Pole to Late	26	550 acres
Post-Harvest Treatments	Deciduous and Pine Forests	Early	26	550 acres
Tree planting	Deciduous and Pine Forests	Early	18	398 acres
Crop Tree Release	Deciduous and Pine Forests	Early to Sapling/Pole	32	674 acres
Group Selection with Thinning	Pine Forests	Sapling/Pole to Late	4	103 acres
Midstory	Deciduous & White Pine Forests	Sapling/Pole to Late	15	513 acres
Prescribed burns	Deciduous and Pine Forests	Sapling/Pole to Late	4 areas	1,955 ac.
Wetland Improvement	Wetland	Early	4 areas	36 acres
Nest/Roost Boxes	Deciduous & White Pine Forests	Early	23	34 boxes
Waterholes	Deciduous Forest/Openings	Early	5	5 ponds
Grouse Drumming Logs	Deciduous Forests	-	-	85 logs
Road Maintenance/Reconstruct	Deciduous and Pine Forests	Mixed	-	16.3 miles
Temp & FS Road Construction	Deciduous and Pine Forests	Mixed	-	1.3 miles
Road Decommission	Mixed Forest & Water Crossings	Mixed	-	4.7 miles
Authorize Existing Roads	-	-	-	8.3 miles

DESIGN CRITERIA

Specific actions will be incorporated into the project design and implementation.

1. Use broad-based dips or water bars on all access ways on non-level slopes.
2. Use a hydrologist or wildlife biologist to assist in the location of ephemeral pools, springs and seeps.
3. Implement Tennessee Best Management Practices (BMPs) as a minimum to achieve soil and water quality objectives. When Forest Plan (RLRMP) Standards exceed BMPs, the standards shall take precedence over Tennessee BMPs.
4. Streamside management zones (riparian corridors and filter zones) would be established, as specified in the RLRMP.
5. Any new threatened, endangered, and/or sensitive species locations discovered within a project area may result in all actions being delayed or interrupted within the area. The appropriate district wildlife/fisheries biologist or botanist would be consulted to determine effects of the action on the species.
6. Trees known to have been used as roosts by Indiana bats are protected from cutting and/or modification until they are no longer suitable as roost trees unless necessary for public safety. Consultation with the US Fish and Wildlife Service (FWS) must occur before cutting or modification.
7. To avoid injury to young Indiana bats, prescribed burning of potential maternity roosting habitat between May 1 and August 15 is prohibited, unless otherwise determined by consultation with the FWS.
8. Snags with exfoliating bark are not intentionally felled unless necessary for public safety. Exceptions may be made for small-scale projects such as insect/disease control, salvage harvesting, and facility construction.
9. During all silvicultural treatments in hardwood forest types, retention priority is given to the largest available trees that exhibit characteristics favored by roosting Indiana bats.

10. Leave (reserve) areas and exclusions would be established, where necessary to minimize impacts to rare species. All ground-disturbing activities (temporary roads, landings, skid trails, etc.) and timber harvest would be excluded from within the reserve areas.
11. Mixing-water for herbicide use would be brought to the site by work crews and not obtained from streams or other bodies of water.
12. No herbicide would be applied within 30 feet of open water except for selective treatments that use herbicides labeled for aquatic use.
13. Off-road equipment would be cleaned of seeds, soil, vegetative matter, and other debris that could hold invasive plant seeds and/or propogules. Off-road equipment would be inspected by a Forest Service representative to prevent NNIS introduction or spread in the project areas.
14. Build the fewest skid trails, logging roads, and log landings as feasible.
15. Skid trails would be placed and rehabilitated in a way that limits the spread of existing non-native invasive species from roads, trails, or powerline corridors, into stand interiors. Skid trails and plow lines would be rehabilitated (re-contoured, seeded, etc) after they are no longer needed.
16. Any cultural resource sites found during implementation of the project would be reported immediately to a Forest Service Archaeologist and work would stop in the area.
17. Skid trails and temporary roads for the purpose of timber harvest would not be constructed for sustained distances over 200 feet in areas with slopes of 40% or greater ("steep area"). The 200-foot length can be exceeded however where the skid trail and/or temporary road is needed to traverse a steep area in order to access the remaining harvest unit(s). Trees within the traversed steep area would not be harvested, except where possible through cable winching to equipment placed outside the steep area.
18. Blend the visual impacts of roads and skid trails so they remain subordinate to the existing landscape character in size, form, line, color and texture.
19. Orient openings to blend with the existing landscape characteristics, based on existing vegetation patterns, contours and other natural-appearing features.
20. Shape and feather unit boundaries to avoid straight edges.
21. Retain natural-appearing tree groupings.
22. Minimize the exposure of mineral soils during construction of skid roads and trails, and revegetate cut-and-fill slopes to the extent possible.
23. Screen log landings from view, and restore as close to the original contour as possible.
24. Minimize impacts to existing trails and travelways, and maintain the visual character in the vicinity of trail corridors and travelways.

2.0 SPECIES EVALUATED AND METHODS USED

This BE addresses Sensitive species that are considered to occur or have habitat on the CNF. Analysis of the project was conducted using the best available science, including references from science-based websites, books, papers, and reports. Information from field surveys and TES database maps identified Sensitive species known to occur in the project area. Project area habitat and species habitat requirements, distributions and limiting factors were used to determine if additional T&E species were likely to occur in the project area.

The 2001 CNF Sensitive Species List was reviewed to determine species to consider. Each species, listed in Attachment A, was evaluated and given a Project Review Code (PRC) using a list (Attachment B) for evaluation. This process, used to decide when to inventory for Sensitive species, is consistent with FSM 2672.43. Some of the PRC's are used for a Determination of Effect (see Attachment B). Based on this process, the following species (Table 5) are analyzed for effects.

TABLE 5. SENSITIVE SPECIES ANALYZED FOR EFFECTS

Scientific Name	Common Name	Group
Desmognathus carolinensis	Carolina mountain dusky salamander	Amphibian
Speyeria diana	Diana fritillary	Insect
Myotis leibii	Eastern small-footed bat	Mammal
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Mammal
Paravitrea placentula	Glossy supercoil	Snail
Ventridens coelaxis	Bidentate dome	Snail
Buckleya distichophylla	Piratebush	Plant
Huechera longiflora var. aceroides	Maple-leaf alumroot	Plant
Thermopsis mollis var. fraxinifolia	Ashleaf goldenbanner	Plant

Bat surveys were conducted in 15 locations across the analysis area from 1998 to 2002. Fish surveys were conducted in the project area from 2008 to 2012. Snail and salamander surveys were conducted in the project area from 2001 to 2013. Botanical surveys including bryophytes and vascular plants were conducted in the proposed treatment areas in 2013 and in additional areas in 1998. Wetland surveys were conducted in 2012 and 2013.

3.0 HABITAT RELATIONSHIPS, EFFECTS ANALYSIS, AND DETERMINATIONS OF EFFECTS

The types of effects to Sensitive species would be the same for Alternatives B, C, and D. Only the size and magnitude of the effects would differ, so the alternatives will be addressed together. Effects from herbicides would be the same for each sensitive plant and animal species (except bats): Herbicides used in treatments (pre and post-harvest treatments, midstory treatments, and wetland improvements) are not likely to come directly in contact with rare plant species, but accidental treatment may occur on rare occasions. Treated plants would be injured or lost dependent upon the amount of chemical applied. Herbicides are not likely to come directly in contact with animals, but may be on food sources that are ingested (plants and insects). The herbicides used present low risk to aquatic species (SERA). However, the impacts of herbicides on amphibians are not known. The following factors would minimize the risk of contamination: 1) herbicide applied in small amounts; 2) specific methods of application such as thinline or stump treatments; 3) design criteria for herbicide use, e.g. timing to avoid rainfall; 4) stream buffers would protect riparian habitats.

3.1 CAROLINA MOUNTAIN DUSKY SALAMANDER (*Desmognathus carolinensis*)

HABITAT RELATIONSHIPS

Carolina mountain dusky salamander is one of the most common salamanders within its range (Petranka 1998). It ranges from Iron Mountain (Unicoi County) to the Pigeon River (Cocke County).

This salamander concentrates near seeps, springs, and streams at lower elevations and during the winter. It may venture into adjacent wooded areas in wet weather and is often found on wet rock faces. It is more terrestrial at higher elevations. It seeks refuge under cover such as rocks and logs in the day (Petranka 1998). It feeds on terrestrial invertebrates and is active both night and day. This salamander has been found in the analysis area and habitat occurs in the affected area.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

This alternative would have no direct, indirect, or cumulative effects on because no action would occur.

DETERMINATION OF EFFECT

This alternative would have ***no impact*** on Carolina mountain dusky salamander.

ALTERNATIVES B, C, AND D

DIRECT EFFECTS

This species is known to occur in the analysis area and would be directly affected by these alternatives. Individuals may be injured or destroyed during road maintenance, road construction, and harvest activities (ESH creation, group selection, and thinning), particularly during tree felling and moving soil with heavy equipment. Direct effects would be short-term, occurring only during the duration of the activities and on a small scale. Mountain dusky salamanders concentrate in riparian forests, where activity would be minimal. Stream filter zones would protect the majority of individuals from harm.

Fire line construction in moist habitats may cut or crush some individuals, although these impacts would be minimal. Removal of downed trees across fire lines where salamanders are located would cause them to relocate away from the line. During drier periods, salamanders are likely to be under logs, moist leaf litter in coves and riparian areas. Low intensity burns in moist habitats do not consume large woody debris. Fire generally burns in a mosaic pattern; leaving much of the cove forests untouched. Therefore most individuals would be protected from direct effects of the fire.

INDIRECT EFFECTS

Harvesting (ESH, group selection, and thinning) within coves would increase sunlight to the forest floor causing leaf litter dry-out and increased surface temperatures. This may cause salamanders to relocate to more moist conditions in adjacent stands. Riparian zones, leave areas, logging slash, and remaining LWD would provide protection within harvested areas. Home ranges of salamanders tend to be very small, on the order of a few to a few dozen meters in diameter. Yet, on occasion, they may travel at least several hundred meters (NatureServe 2013), which would be outside of the affected area. Additional habitat would remain undisturbed in adjacent areas within an acceptable travel distance. Over time, canopy cover would increase to more suitable conditions again and the salamanders should return to the area. Salamanders are known to recolonize a clearcut over 4-15 years and reach pre-harvest levels in up to 20 years (Ash 1997).

Only a small amount of habitat would be lost where road construction occurs. Midstory treatments, crop tree release, and wetland improvements would still allow shaded conditions and would not affect habitat to any degree. The addition of grouse drumming logs would improve habitat conditions in the future. Road decommissioning would return a small portion of suitable habitat to

more suitable conditions. Waterhole construction may provide a small amount of habitat in drier areas.

Prescribed burns would be of low intensity and patchy with minimal impacts to Carolina mountain dusky habitat. Unburned patches would continue to provide leaf litter, logs, and rock habitats within the affected areas. In burned patches, some large downed wood usually remains in low intensity burns. Leaf litter and food availability would temporarily decline within the burn units, but the forested landscape of the project area would remain. Another layer of leaf litter would return the following year. These impacts would be short-term for the population which would persist in the area. Habitat is scattered throughout the analysis area, and the majority of the populations would not be impacted.

Tree planting, nest/roost boxes, and authorizing existing roads would have no impact on this species.

CUMULATIVE EFFECTS

Combined with past and future burning activities, the alternatives would have a negative cumulative effect on these salamanders. Burning combined with the proposed ESH and road construction would decrease suitable habitat in the analysis area due to the loss of large woody debris (cover), shading, increased sunlight, and elevated temperatures on the forest floor. Habitat would remain widely available in adjacent stands and across the analysis area and populations would persist, so these negative cumulative effects would not contribute to the decline of these species or their habitats across the CNF.

DETERMINATION OF EFFECT

Implementation of Alternatives B, C, or D ***may impact individuals but is not likely to cause a trend toward federal listing or loss of viability*** of Carolina mountain dusky salamander.

3.2 DIANA FRITILLARY (*Speyeria diana*)

HABITAT RELATIONSHIPS

Diana fritillary is primarily found in the mountains from central Virginia and West Virginia to north Georgia and Alabama. It is more abundant from southwestern Virginia to the Great Smokies region and rare and sporadic elsewhere. A major range wide decline in the past resulted in a substantial loss of its historic range. It may be increasing in areas where second growth forests are becoming mature and where gypsy moth spraying is not widespread (NatureServe 2013).

Breeding habitat in most of the range consists of moist, deciduous or mixed forests with abundant violets in the understory. The larvae hatch in the fall, over-winter as caterpillars, and begin feeding on violets in early spring. Adults feed on nectar from flowers in open areas and are also found on scat and moist soil. Because adults and larvae require different types of habitat in substantial amounts, the home ranges of these butterflies require large areas of land with diverse habitats (NatureServe 2013). Dianas occur across the northern CNF, having been observed by district biologists in at least 56 locations in recent years. Diana fritillaries have been found in the analysis area and habitat occurs in the affected area.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

This alternative would have no direct or cumulative effects on Diana Fritillary because the actions would be deferred. Dianas would be indirectly impacted because habitat diversity would decline over the next five years as forests matured into the later age classes, reducing the amount of adult nectaring/foraging habitat.

DETERMINATION OF EFFECT

Alternative A ***may impact individuals but is not likely to cause a trend toward federal listing or loss of viability*** on Diana fritillary.

ALTERNATIVES B, C, AND D

DIRECT EFFECTS

Adults and caterpillars may be directly impacted by the alternatives. Road construction, tree felling, and skidding (ESH creation, group selection, and thinning) may damage or destroy caterpillars on the ground and/or adults roosting in trees. These direct effects would be short-term, occurring only during the duration of the activities and would be limited to the action areas. Stream filter zones would protect individuals in riparian areas from harm.

Diana larvae would be hibernating in the moist cove forests when burning is implemented. Fire generally burns in a mosaic pattern; leaving much of the cove forests untouched. A portion of the population of larvae in cove forests could be directly impacted by burning. The remaining individuals within and adjacent to the burned areas would repopulate the area over time, but it is not known how long that would take.

INDIRECT EFFECTS

The alternatives would indirectly affect caterpillar habitat. Harvesting (ESH, thinning, and group selection) in mature MDF would increase sunlight to the forest floor, decreasing conditions for the growth of violets, the host plant for the species. As the forest regenerates and post-harvest treatments thin re-growth, host plant habitat conditions would become more favorable within five years. However, conditions may not be optimal until the forest matures. Crop tree release, midstory treatments, and wetland improvements would still allow for shaded conditions for caterpillars or their host plant. Only a small amount of caterpillar habitat would be destroyed due to waterhole construction and road construction. Road decommissioning would return a small portion of suitable habitat to more suitable conditions.

The increased sunlight from harvesting would be beneficial for nectaring adults by increasing the growth of flowering plants for five to ten years post-harvest. Crop tree release, midstory treatments, and wetland improvements may encourage flowering plant abundance and diversity for nectar gathering. Although burning would have negative direct effects, this management would also have beneficial indirect effects. In some areas more open conditions would be created, making conditions more suitable for Diana breeding habitat. Burning would also improve foraging habitat for adult Dianas by increasing light conditions and flower production (NatureServe 2013).

Road maintenance, authorization, tree planting, nest/roost boxes, and grouse log installation would have no impact on Dianas. The alternatives would maintain a diverse forested landscape and would ensure that the viability of the Diana population on the CNF.

CUMULATIVE EFFECTS

Cumulative effects of past and future burning, combined with the alternatives would be negative to caterpillars but beneficial to adults. The project would have a positive cumulative effect on Diana fritillary by creating more open habitat and improving habitat diversity. Diana fritillary is abundant in some areas where prescribed burning has been taking place on a three to five year rotation since 1995 and where multiple timber harvests have occurred. These effects would not contribute to the decline of this species or its habitat across the CNF.

DETERMINATION OF EFFECT

Alternatives B, C, or D ***may impact individuals but not likely to cause a trend to federal listing or loss of viability*** on Diana fritillary.

3.3 EASTERN SMALL-FOOTED BAT (*Myotis leibii*) AND RAFINESQUE'S BIG-EARED BAT (CORYNORHINUS RAFINESQUII)

HABITAT RELATIONSHIPS

EASTERN SMALL-FOOTED BAT

This bat is moderately widespread with spotty distribution from southeastern Canada to Alabama and Georgia, west to Oklahoma. In summer they roost in rock outcrops and cliffs, rock crevices, caves, mines, bridges, trees, and buildings. Rocky areas or bridges with a sunny exposure in forested landscapes may be important maternity site features. These bats hibernate singly or in small groups only in coldest periods of winter and early spring in caves, mines, and buildings (Harvey, et al 1999). They typically forages over streams, ponds, roads, and waterholes (NatureServe 2013).

Forest-wide sampling from 1990 to 2011 captured over 3,213 bats, documenting 157 small-footed bats and several maternity colonies spread across most counties of the CNF. Indiana bat mist net surveys were conducted in the Paint Creek area in the summers of 1998, 1999, and 2002. During the surveys, one Eastern small-footed bat was captured at one out of 13 sites; six of the sites had no bat captures. Foraging and roosting habitats for the species are present across the analysis area.

RAFINESQUE'S BIG-EARED BAT

This species ranges widely in forested regions of the southern states from Virginia, West Virginia, Ohio, Indiana, and Illinois south to the Gulf of Mexico, west to Louisiana, Oklahoma, and eastern Texas. Hibernation in the north and mountainous regions most often occurs in small caves or similar sites. The bats stay near the entrance (often within 30 m) and move about in winter. Summer roosts often are in hollow trees, occasionally under loose bark, or in abandoned buildings in or near wooded areas. They forage primarily in mature forests (Mitchell 2001).

An effort of forest-wide sampling has documented only one occurrence of this species. It was located along the French Broad River in Cocke County. Although no individuals have been found in the watershed, summer roosting and foraging habitats are available in the project area.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

This alternative would have no direct, indirect, or cumulative effects on Eastern small-footed bat and Rafinesque's big-eared bat because the actions would be deferred.

DETERMINATION OF EFFECT

This alternative would have ***no impact*** on Eastern small-footed bat and Rafinesque's big-eared bat.

ALTERNATIVES B, C, AND D

DIRECT EFFECTS

Eastern small-footed bats and Rafinesque's big-eared bats could be directly affected during road construction and harvest (ESH, thinning, and group selection), the activities may disturb, injure, or destroy roosting bats. Small-footed bat maternity roosts could be disturbed during harvesting activities in stands with rocky habitats, causing adults to leave their roosts temporarily. These impacts would be short-term and on a small scale.

Burning may disturb individuals roosting in rock crevices or trees; however, habitats where bats may roost this time of year (rock crevices for small-footed bats and hollow trees along streams for Rafinesque's) would not burn intensely, if at all. If disturbed, bats would likely avoid the areas during the burn and return immediately afterward. Any disturbance would be short-lived, not detrimental, as these bats are known to move about in the winter (Harvey, et al 1999, Mitchell 2001, NatureServe 2013).

INDIRECT EFFECTS

The alternatives would indirectly affect Eastern small-footed bat and Rafinesque's big-eared bat by alteration of roosting and foraging habitat. Removal of trees during harvest (ESH, thinning, and group selection) and road construction would contribute to the loss of future roosting habitat although most standing snags would be retained. The 15-20 basal area per acre (BA) remaining in ESH and 35-60 BA in the thinned areas and group selection would ensure that roosting habitat would continue to be available in harvested stands over the next five years. The RLRMP requires the largest trees with favorable conditions for roosting bats to be left. It also requires retention of all shagbark hickory trees (>6 inch diameter) and snags with exfoliating bark. New snags would develop from trees damaged during harvest, creating roosting habitat in the future. Installation of bat boxes would provide potential roosting habitat. The alternatives would provide open patches of forest with standing snags for roosting. The open condition of these areas would make roosting habitat more suitable by providing more sunlight to maintain warmer conditions in the roost.

Herbicides would be used to control woody vegetation and treat non-native invasive species. Glyphosate, Imazapyr, and Triclopyr would be used for both pre- and post-harvest site treatments in all stands proposed for early successional forest creation. Imazapyr and Glyphosate would be used for both pre- and post-harvest site treatments in stands proposed for thinning and midstory treatment. Glyphosate would also be used to treat approximately two acres of encroaching woody vegetation within and along the edges of a small wetland at Allen Gap, restoring it to a more open condition.

The herbicides used for treatments would not contact bats directly, but may be present in trace amounts on an occassional insect ingested by bats, although the likelihood of this occurrence is small. The following factors would further minimize the risk of contamination: 1) herbicide applied in small amounts; 2) very specific methods of application such as thinline or stump treatments; and 3) design criteria for herbicide use such as timing to avoid rainfall and 30-foot buffer zones. Timing of application and quantities applied would ensure that no measurable effects to water quality would occur even in aquatic scenarios. See Attachment A –Herbicide Use Assumptions for herbicides to be used. Effects of the individual herbicides can be found below.

- *Glyphosate* is categorized by EPA as practically non-toxic to honeybees, fish, and aquatic invertebrates and that the effects on mammals are minimal, including most endangered terrestrial organisms (exceptions are plants and a toad - due to habitat). Glyphosate is excreted in waste and is not bioaccumulated in animals (EPA 1993). Risk characterizations for glyphosate indicated that mammals are not at risk (SERAg 2011).
- *Imazapyr* is categorized by EPA as practically non-toxic to mammals, birds, honeybees, fish, and aquatic invertebrates. EPA has determined that there are no risks of concern to terrestrial mammals and bees or to aquatic invertebrates (EPA 2006). Imazapyr does not bioaccumulate in mammals, as it is rapidly excreted in waste (WDOT 2006), and does not bioaccumulate in aquatic organisms (SERAi 2011).
- *Triclopyr* is categorized by EPA as practically non-toxic to mammals, insects, and freshwater invertebrates (EPA 1998). Applications of triclopyr at the rate they would be used in the Paint Creek project are not likely to cause adverse effects to small mammals or changes in populations due to changes in vegetation. Triclopyr has not been found to bioaccumulate in mammals or aquatic organisms. No risks from exposure to triclopyr are apparent for aquatic invertebrates (SERAt 2011).

Prescribed fire generally burns in a mosaic pattern, with some areas burning completely while others little to none, particularly in moist coves. Although prescribed fire activities may eliminate some potential roosting trees, fire would also create new snags and damaged trees, providing additional roosting habitat. New snags are needed over time as old snags deteriorate and lose sloughing bark. Since roost trees are ephemeral, bats are adapted to finding new roost trees should previous roosts be lost during the fire.

Creation of ESH, thinning, group selection, midstory, crop tree release, and burning would increase light intensity and herbaceous plant diversity for the next five to ten years. These activities would increase insect production and improve forage conditions for bats. Construction of vernal ponds would supply upland water sources and improve foraging conditions. Road maintenance, decommissioning, obliteration, recontouring, and wetland restoration would improve water quality along Paint Creek where bats may forage.

Road authorization, tree planting, nest boxes, and grouse drumming log installation would have no effect on Eastern small-footed bats and Rafinesque's big-eared bats.

Cumulative Effects
These alternatives, combined with past and future burning would have a positive cumulative effect on Eastern small-footed bat and Rafinesque's big-eared bat. Snags would have been lost and created during past prescribed burning and would be retained or created in future thinning. The cumulative effect would be a more open and diverse forest with abundant snags and better foraging opportunities.

DETERMINATION OF EFFECT

Alternatives B, C, or D ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on Eastern small-footed bats and Rafinesque's big-eared bats.

3.4 GLOSSY SUPERCOIL (*Paravitrea placentula*) AND BIDENTATE DOME (*Ventridens coelaxis*)

HABITAT RELATIONSHIPS

GLOSSY SUPERCOIL

Glossy supercoil occurs under leaf litter on wooded hillsides and ravines in Virginia, Kentucky, Tennessee, and North Carolina (Mitchell 2001). On the CNF it is known from 6 sites in Polk, Monroe, Cocke, Carter, and Sullivan counties. The species is known from mixed mesophytic and dry to mesic oak forests beneath leaf litter, downed wood, and rocks. Specific forest types include acidic and rich cove, high elevation northern red oak, and montane oak hickory forests (Caldwell 2004).

BIDENTATE DOME

Bidentate dome occurs in Virginia, Kentucky, Tennessee, and North Carolina (NatureServe 2013). Five records of this snail on the CNF occur in Carter County and three in Johnson County. This species occurs in mid to high elevation mixed mesophytic forests, dry to mesic oak forests, and conifer northern hardwood forests; specific forest types include rich cove and possibly acidic cove, white pine-hemlock-hardwood, high elevation northern red oak, and montane oak hickory forests (Caldwell 2004).

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

This alternative would have no direct, indirect, or cumulative effects on these snails because the actions would be deferred.

DETERMINATION OF EFFECT

Alternative A would have ***no impact*** on glossy supercoil and bidentate dome.

ALTERNATIVES B, C, AND D

DIRECT EFFECTS

Glossy supercoil and bidentate dome may be directly impacted (relocated or crushed) during harvest (ESH, thinning, and group selection), road construction, road construction, and waterhole construction, particularly during tree felling and moving soil with heavy equipment. Any direct effects would be short-term, occurring only during the duration of the activities and limited to the activity area. Individuals in underground retreats, at the base of trees, and under large logs would be protected from direct impacts. Compliance with RLRMP standards, including the stream filter zones, would protect individuals in riparian areas from harm.

Fire line construction may crush some snails; others would be able to relocate. Snails are most abundant in the humus layer, leaf litter, rocks, and wood on the forest floor (Burch and Pearce 1990). Because these species occur within leaf litter, some mortality could occur as a result of the burning. However, during dry periods (suitable for burning) most would remain in the humus or the moist bottom layer of the leaf litter (Royal BC Museum 2006) or under logs and rocks. Low intensity fire generally burns in a mosaic pattern; leaving much of the cove forests untouched. Moist leaf litter generally does not burn and fire does not consume the majority of large woody debris, so refuge such as large logs and rocks would remain. These refuges are the most important habitat component and the main limiting factor for their success. If individuals are lost, remaining ones would be capable of repopulating as they are hermaphrodites and can fertilize themselves (Burch and Pearce 1990).

INDIRECT EFFECTS

Negative and long-term indirect effects would occur in potential habitat. Harvest (ESH, thinning, and group selection) would increase sunlight to the forest floor causing leaf litter to dry out, and increased surface temperatures. This may cause snails to relocate to more moist conditions in adjacent stands. However, snails are able to survive dry periods, sometimes for years (Burch and Pearce 1990). Habitat would remain in harvested areas in the form of underground retreats, slash piles, and logs. By protecting them from dry conditions and predators, refugia are the most important limiting factor for these animals (Burch and Pearce 1990). Over the years, canopy cover would increase to more suitable conditions, and the snails should return to the area.

Where complete burning of the leaf litter does take place, habitat conditions would temporarily become unfavorable. The loss of their protective cover would result in movements to unburned areas, exposing snails to predation. Snails are not able to move quickly or over much distance, and do not generally move around except to find food and for reproduction (NatureServe 2013). The unburned patches would continue to provide habitat within the affected areas. Another layer of leaf litter would return the next autumn. Burning does not greatly reduce snail diversity (Royal BC Museum 2006), and small snails have been found in previously burned areas on the CNF. These impacts would be short-term and populations would persist in the areas.

Only a small amount of habitat would be lost where road construction occurs. Road maintenance would have some beneficial indirect effects; the addition of limestone gravel on the roads would provide an additional source of calcium for shell production (Burch and Pearce 1990). After implementation, the snails would use the areas again. Midstory treatments, crop tree release, and wetland improvements would still allow shaded conditions and would not affect habitat to any degree. The addition of grouse drumming logs would improve habitat conditions in the future.

Road decommissioning would return a small portion of suitable habitat to more suitable conditions. Waterhole construction may provide a small amount of habitat in drier areas. Nest box installation, tree planting, and road authorization would not cause any impacts.

CUMULATIVE EFFECTS

Combined with past thinning and past and future burning, the alternatives would have a negative cumulative effect on these snails. Burning combined with the proposed harvest activities would decrease suitable habitat in the analysis area due to the loss of large woody debris (cover), shading, increased sunlight, and elevated temperatures on the forest floor. Habitat would remain widely available in adjacent stands and across the analysis area and populations would persist, so these negative cumulative effects would not contribute to the decline of these species or their habitats across the CNF.

DETERMINATION OF EFFECT

Implementation of Alternatives B, C, or D ***may impact individuals but not likely to cause a trend to federal listing or loss of viability*** of glossy supercoil and bidentate dome.

3.5 PIRATEBUSH (*Buckleya distichophylla*)

HABITAT RELATIONSHIPS

Piratebush is a Southern Appalachian endemic, known only from Virginia, Tennessee, and North Carolina. This plant occurs in the Blue Ridge physiographic province with a few populations in the

adjacent Ridge and Valley physiographic province (NatureServe 2013). Its habitat associations include open, dry, rocky woods and bluffs, typically within calcareous-shaley soils. It also occurs within calcareous-shaley along the French Broad and Pigeon Rivers. Most sites occur between 1900-3300 feet. Piratebush is known from at least 14 locations on the Cherokee National Forest. Some individuals would be impacted by ongoing maintenance (roads, trails, openings) under all alternatives. This plant was documented in five sites within the analysis area (McGuiness 2013). Two sites are located in close proximity to areas proposed for crop tree release under at least one alternative.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

No new activities are planned under this alternative. Populations would fluctuate based upon ongoing activities and available habitat conditions.

Piratebush has been documented in close proximity to roads, trails, and power lines, within the Paint Creek analysis area. Current management activities would continue under this alternative. Individuals occurring in these areas would continue to be periodically disturbed by use and maintenance activities. Trampling, disturbance, and loss of individuals would occur as a result of these activities. Competition from native and invasive species would also contribute to population fluctuations over time; however, extirpation from the area would not be expected. These disturbances help create and maintain suitable habitat conditions allowing plants to occupy these locations. Maintenance and use activities have been ongoing for many years and piratebush has adapted to this level of disturbance at these sites.

There are no cumulative effects on piratebush associated with Alternative A because no new actions would be implemented under this alternative. Future habitat conditions within the Paint Creek area would be the result of natural processes, ongoing activities, and past and future projects.

DETERMINATION OF EFFECT

This alternative ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on piratebush.

ALTERNATIVES B, C, AND D

DIRECT AND INDIRECT EFFECTS

Piratebush has been documented in close proximity to two sites within the analysis area that have been proposed for crop tree release under Alternatives B, C, and D. This plant is also known from three other sites within the analysis area which are not impacted under these alternatives. If individuals are present within these sites, then crop tree release (chainsaw slashdown) would result in some impacts including limb breaking, trampling, covering by cut stems, and accidental treatment. Individuals located within riparian areas or outside the stand boundary would be protected from direct impacts. Treatment would result in the removal of competing vegetation providing favorably habitat conditions for recovery (resprouting and growth) and establishment following the project. Populations may increase after treatment for 2-5 years and then slowly decline as canopy cover is established. Plants would remain within the future stand where suitable habitat is present.

Some populations are in close proximity to roads and trails. Maintenance would result in damage and potentially loss of a few individuals located in very close proximity to the road. Trail

maintenance results in the trimming back of branches growing into the trail. Maintenance activities have been ongoing for many years and this species has adapted to this level of disturbance, and takes advantage of the habitat conditions provided at these sites. Populations would initially decline, but then take advantage of the suitable habitat conditions to recover and potentially expand at these sites. This results in population fluctuations, but piratebush is expected to remain at these sites.

CUMULATIVE EFFECTS

Piratebush would benefit from a low intensity prescribed fire by taking advantage of light gaps and reduced competition. This shrub would incur some direct impacts, but resprouting would allow individuals to take advantage of beneficial habitat conditions. A moderate to high intensity burn or wildfire could result in some negative impacts as direct impacts combined with changes in light and moisture conditions may reduce habitat quality. Plants would re-sprout and future populations would be determined by available habitat conditions.

Recent minor flood events have had little impact on current populations. Any future flood events along the French Broad River would impact individuals occurring at these sites. Depending on the intensity of the flood, damage and some mortality would occur. These events maintain an open midstory, providing suitable habitat conditions for piratebush. Populations would fluctuate, but plants would remain in the area.

DETERMINATION OF EFFECT

Alternative B, C, and D ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on piratebush.

3.6 MAPLE-LEAF ALUMROOT (*Heuchera longiflora var. aceroides*)

HABITAT RELATIONSHIPS

Maple-leaf alumroot occurs in east and central Kentucky, southern Ohio, southwestern West Virginia, southwest Virginia, northeast Tennessee, western North Carolina, and possibly central Alabama. It is nearly limited to sedimentary rocks. Maple-leaf alumroot occurs in rich shaded forests and woodlands over calcareous rocks (Weakley 2012). This plant is known from at least 16 locations on the Cherokee National Forest. Some individuals would be impacted by ongoing maintenance (roads, trails, openings) under all alternatives. Maple-leaf alumroot was documented in 13 sites within the analysis area (McGuiness 2013). Six of these areas are proposed for treatment under at least one alternative. These treatments include shelterwood harvest, thinning, prescribed burning, and midstory treatment. Some occurrences have been excluded from direct impacts as a result of management recommendations and decisions to ensure that individuals remain in the area.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

No new activities are planned under this alternative. Populations would fluctuate based upon ongoing activities and available habitat conditions.

Maple-leaf alumroot has been documented in close proximity to roads within the Paint Creek analysis area. Current management activities would continue under this alternative. Individuals occurring in these areas would continue to be periodically disturbed by use and maintenance activities. Disturbance and loss of individuals would occur. Competition from native and invasive species would also contribute to population fluctuations over time; however, extirpation of this species would not be expected. These disturbances help create and maintain suitable habitat conditions allowing plants to occupy these locations. Maintenance and use activities have been ongoing for many years and maple-leaf alumroot has adapted to this level of disturbance.

There are no cumulative effects on maple-leaf alumroot under Alternative A because no new actions would be implemented under this alternative. Future habitat conditions within the Paint Creek area would be the result of natural processes, ongoing activities, and past and future projects.

DETERMINATION OF EFFECT

This alternative ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on maple-leaf alumroot.

ALTERNATIVES B, C, AND D

DIRECT AND INDIRECT EFFECTS

Maple-leaf alumroot was documented from five sites within the analysis area that have been proposed for shelterwood harvest, thinning and prescribed burning under Alternatives B and C. Fewer individuals are impacted under Alternative C than B, due to changes in the size of the treatment areas under this alternative. A sixth occurrence is impacted by midstory treatment under Alternative D. Some populations are in close proximity to roads and may be impacted by road maintenance activities. This plant is also known from seven other sites within the analysis area which are not impacted under any of these alternatives.

Impacts of road maintenance would be similar to those described for piratebush. Shelterwood harvest and thinning would result in the loss of some individuals. Individuals located within leave clumps, exclusions, or outside the stand boundary would be protected from direct impacts. Habitat conditions would be favorable for recovery, establishment, and expansion within thinning areas and leave clumps following the project. Populations would be expected to increase after treatment for 2-5 years and then slowly decline as canopy cover is established. Habitat conditions would be less favorable for plants located within shelterwood areas. Light conditions and increased plant competition would result in higher mortality rates and slower recovery within these areas. Plant populations would fluctuate in response to available habitat conditions. Plants would remain within the future stand where suitable habitat is present.

Under Alternative D, midstory treatment may result in some individual losses due to accidental treatment with herbicide. Treatment would reduce competition and increase light conditions creating favorable conditions for recovery and expansion. Population increases would be expected for 2-5 years following treatment, then slowly decline towards previous levels as shading decreases light availability.

Individuals are known to occur within the Devil's Kitchen and Ricker Mountain prescribed burns. Some individuals may be lost or damaged during the construction of fire lines. Direct impacts from burning are not expected as plants would be dormant at the time of the burn. Prescribed burning would improve habitat conditions for maple-leaf alumroot by reducing midstory vegetation and

maintaining/creating filtered to partial light conditions within the area. Plants would respond favorably to these conditions allowing population expansion to occur over the next two to five years.

CUMULATIVE EFFECTS

This alternative, combined with past and future burning (both prescribed and wildfires) would have a positive cumulative effect on maple-leaf alumroot. Dormant season burns are not expected to directly impact individuals, but some direct impacts would occur as a result of summer wildfires. Burning would reduce woody competition within these areas. This would improve habitat conditions by reducing plant competition from woody plants in the understory and midstory. Increase light resulting from reduced plant competition would improve flowering rates where suitable habitat is present. Establishment could occur in areas where herbaceous plant competition is low to moderate. Future burning of this area would maintain suitable habitat conditions for these species within this project area.

DETERMINATION OF EFFECT

Alternative B, C, and D ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on maple-leaf alumroot.

3.7 ASHLEAF GOLDENBANNER (*Thermopsis mollis var. fraxinifolia*)

HABITAT RELATIONSHIPS

Ashleaf goldenbanner is a Southern Appalachian endemic known from Tennessee, North Carolina, South Carolina, and Georgia (NatureServe 2013). Its habitat includes openings and ridges in dry woodlands. It often occurs on road banks. Ashleaf goldenbanner is known from at least 29 locations on the Cherokee National Forest. Some individuals would be impacted by ongoing maintenance (roads, trails, openings) under all alternatives. This plant was documented in two sites within the analysis area (McGuiness 2013). One of these sites is proposed for prescribed burning under Alternative B.

ALTERNATIVE A

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

No new activities are planned under this alternative. Populations would fluctuate based upon ongoing activities and available habitat conditions.

Ashleaf goldenbanner has been documented in close proximity to roads within the Paint Creek analysis area. Current management activities would continue under this alternative. Individuals occurring in these areas would continue to be periodically disturbed by use and maintenance activities. Disturbance and loss of individuals would occur as a result of these activities. Competition from native and invasive species would also contribute to population fluctuations over time; however, extirpation from the area would not be expected. These disturbances help create and maintain suitable habitat conditions allowing plants to occupy these locations. Maintenance and use activities have been ongoing for many years and ashleaf goldenbanner has adapted to this level of disturbance.

There are no cumulative effects on ashleaf goldenbanner associated with Alternative A because no new actions would be implemented under this alternative. Future habitat conditions within the Paint Creek area would be the result of natural processes, ongoing activities, and past and future projects.

DETERMINATION OF EFFECT

This alternative ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on ashleaf goldenbanner.

ALTERNATIVE B

DIRECT AND INDIRECT EFFECTS

Ashleaf goldenbanner was documented from two sites within the analysis area. One of these sites is located within the Upper Paint Creek prescribed burn proposed in Alternative B. Both sites are located adjacent to roads and would be impacted by road maintenance activities prior to the burn. Impacts of road maintenance would be similar to those described for piratebush. Direct impacts from burning are not expected as plants would be dormant at the time of the burn. Prescribed burning would improve habitat conditions for ash-leaf goldenbanner by reducing midstory vegetation that is partially shading this population. Gaps created in the thick mountain laurel cover adjacent to this site may provide opportunities for population expansion over the next two to five years following the burn.

CUMULATIVE EFFECTS

This alternative, combined with past and future burning (both prescribed and wildfires) would have a positive cumulative effect on ashleaf goldenbanner. Dormant season burns are not expected to directly impact individuals, but some direct impacts would occur as a result of summer wildfires. Burning would reduce woody competition within these areas. This would improve habitat conditions by reducing plant competition from woody plants in the understory and midstory. Increase light resulting from reduced plant competition would improve flowering rates where suitable habitat is present. Establishment could occur in areas where herbaceous plant competition is low to moderate. Future burning of this area would maintain suitable habitat conditions for these species within this project area.

DETERMINATION OF EFFECT

Alternative B ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on ashleaf goldenbanner.

ALTERNATIVES C AND D

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

Ashleaf goldenbanner has been documented in close proximity to roads within the Paint Creek analysis area. Current management activities would continue under this alternative. Individuals occurring in these areas would continue to be periodically disturbed by use and maintenance activities. Disturbance and loss of individuals would occur as a result of these activities. Competition from native and invasive species would also contribute to population fluctuations over time; however, extirpation from the area would not be expected. These disturbances help create and maintain suitable habitat conditions allowing plants to occupy these locations. Maintenance

and use activities have been ongoing for many years and ashleaf goldenbanner has adapted to this level of disturbance.

Other management activities under Alternatives C and D would improve habitat suitability for this species within treatment areas. Although individuals are not known from these areas, some management actions (thinning, midstory treatments, prescribed burning, etc) would create open to semi-open conditions preferred by this species. Creation of this habitat would provide opportunities for establishment within the Paint Creek Watershed.

CUMULATIVE EFFECTS

Cumulative impacts would be the same as those described under Alternative B.

DETERMINATION OF EFFECT

This alternative ***may impact individuals but not likely to cause a trend to federal listing or a loss of viability*** on ashleaf goldenbanner.

4.0 SUMMARY OF EFFECTS DETERMINATIONS

Table 7 summarizes the determinations of effect for each species.

TABLE3. DETERMINATIONS OF EFFECT FOR ALTERNATIVES

Scientific Name	Alternative A	Alternatives B, C, & D
Desmognathus carolinensis	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Speyeria diana	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Corynorhinus rafinesquii	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Myotis leibii	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Paravitrea placentula	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Ventridens coelaxis	No impact	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Buckleya distichophylla	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Heuchera longiflora var. aceroides	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability
Thermopsis mollis var. fraxinifolia	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability	May impact individuals but is not likely to cause a trend toward federal listing or loss of viability

5.0 SIGNATURE OF PREPARERS

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North Zone Fisheries Biologist
December 4, 2013

/s/ *Joseph H. McGuiness*
North Zone Wildlife Biologist
November 27, 2013

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ATTACHMENT A

PAINT CREEK PROJECT

CNF Sensitive Species 2001 List

Revised 1/30/13 MSC

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
Amphibians							
4a	*Desmognathus carolinensis*	Carolina Mountain Dusky Salamander	NC & TN; Iron Mtn. Gap (Unicoi Co.) to Pigeon River Valley (Cocke Co.)	Common in Unicoi, Greene, Cocke, Washington Counties	Seeps, springs, headwater streams, wet rock faces at lower elevations; more terrestrial at higher elevations; v. common in spruce/fir & northern hardwood forests; 900-6600 ft.	S	G4
1a	*Desmognathus santeetlah*	Santeetlah dusky salamander	NC & TN; Unicoi, Great Smoky, &Great Balsam Mtns. Monroe to Cocke Co.	4 records; Monroe Co. & SW Cocke Co.	Mid-high elevation seeps, stream headwaters, rock faces; 640-1805 m, primarily > 3200 ft.	S	G3G4Q
1a	*Eurycea junaluska*	Junaluska salamander	W NC & SW TN; Sevier Co. & Monroe Co., TN	8 Monroe Co. records Tellico, Bald & North Rivers, Citico & Slickrock Creeks; potentially Hiwassee River drainage; total 17 streams range wide	Large streams with sand-gravel substrate, large rocks & adjacent riparian forests. Low elevation, 1100-2000 ft.	S	G3
1a	*Plethodon aureolus*	Tellico salamander	Unicoi Mtns & adjacent valleys of TN and NC, between Little TN & Hiwassee Rivers	1 Monroe Co. record; also in Polk Co.	Hardwood and pine-hardwood forest; terrestrial breeder in leaf litter humus/rotting logs	S	G2G3
1a	*Plethodon teyahalee*	Southern Appalachian salamander	TN, NC, SC, GA; W of French Broad in Cocke Co. to Unicoi Mtns in Polk & Monroe Co.	Polk, Monroe, Cocke Cos.	Deciduous, mesic forest; terrestrial breeders (underground); <5000 ft.	S	G3
1a	*Plethodon welleri*	Weller's salamander	SW VA to NE TN & NW NC; Johnson, Carter & Unicoi Co.	11 TDEC records; Johnson, Carter, Unicoi Cos.	Spruce-fir, birch-hemlock and other mesic, rocky forests; boulderfields; grassy open areas; terrestrial breeder- moss mats & rotting logs; > 2200 ft.	S	G3
Birds							
1a	*Falco peregrinus*	Peregrine Falcon	US and CAN	2 TDEC records; hacking Big Bald 1987-89. Carter, Greene, Unicoi Cos.	Nests at ledges of vertical rocky cliffs. Feeds in fields, lakeshores, and river mouths.	S	G4
1a	*Haliaeetus leucocephalus*	Bald eagle	US and CAN	2 TDEC records; active nest at Parksville Lake 2006-7; hacking S. Holston Lake 1991-94; other recent nests Tellico Lake. Carter, Johnson, Unicoi, Sullivan, Monroe Washington, Polk Cos.	Nests in large "supercanopy" trees along lake & river shores. Prefers roosts in conifers & protected areas along open water in winter.	S	G5
1a	*Lanius ludovicianus migrans*	Migrant loggerhead shrike	ME to MN south, from GA to AR; OK, TX; CAN: PE to MB	O TDEC records; occurs throughout E. Tennessee; Greene Co. near Forest	Low elevation crop & grasslands and old fields with scattered trees, shrubs, posts	S	G4T3Q
Fish							

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	*Cottus baileyi*	Black sculpin	SH	20 occ in tributaries to Beaverdam and Laurel Crs	Cool and cold water rivers and streams to headwater springs. Rare in Streams over 15m wide. Utilize riffles, runs, and pools with gravel, stone, and boulder substrates. Mod. To high gradient.	S	G4Q
1a	*Etheostoma acuticeps*	Sharphead darter	N	1 occ. Nolichucky R #1	Large creeks to medium rivers, moderate gradient, cool warm water	S	G2G3
1a	*Etheostoma brevirostrum*	Holiday Darter	C	3 occ Conasauga R #1 & #2; Jack's R	Large streams to medium rivers, moderate gradient, low elevation	S	G2
1a	*Etheostoma vulneratum*	Wounded darter	LT, FB	2 occ Citico Cr #4 & Tellico R #1	Small to large rivers, low to moderate gradient, low to moderate elevations	S	G3
1a/7a	*Ichthyomyzon greeleyi*	Mountain brook lamprey	H,O, FB, N, SH	4 occ Hiwassee R #4; & #5; Spring Cr.#1 and Ocoee R #1	Small streams to small upland rivers, moderate to high gradient	S	G4
1a	*Percina burtoni*	Blotchside logperch	H, SH, LT	2 occ. Spring Cr #1 & Hiwassee R #1	Large streams to small rivers, moderate gradient, low elevation	S	G2G3
1a	*Percina palmaris*	Bronze darter	C	3 occ Conasauga R #1 & #2; Jack's R	Small to medium rivers, moderate gradient, low elevation.	S	G4
1a	*Percina squamata*	Olive darter	H, FB, N, W, O	1 occ. Hiwassee R. #4;	Small to medium rivers, moderate to high gradient, moderate elevations	S	G3
1a	*Percina williamsi*	Sickle darter	SH, W, FB	0 occ	Large streams to medium rivers, moderate gradient, low to moderate elevations.	S	G2
1a7a	*Phenacobius crassilabrum*	Fatlips minnow	P, FB, N, W, SH	2 occ Nolichucky R #1 & #3	Large streams to medium rivers, moderate to high gradient, moderate elevation	S	G4
1a	*Phoxinus tennesseensis*	Tennessee dace	O, H, LT, N, W, SH;	40 occ. O=13; H=15; LT=11; SH=1	1st order spring-fed streams (1-2 m wide) of R&V region & mountain fringes; low to moderate gradients, low to moderate elevation	S	G3
Insects and Millipedes							
1a	*Cheumatopsyche helma*	Helma's net-spinning caddisfly	Known from at least one occurrence in 8 states: NH, PA, WV, KY, NC, TN, AL, AR; most recently discovered in Arkansas and in Abrams Cr in the GSMNP, TN	1 occ. Big Lost Cr (Hiwassee)	Large streams, low gradient, low elevation	S	G3
1a	*Dixioria fowleri*	A millipede	VA, TN, Laurel Fork drainage in VA; Beaverdam Crk in TN	1 occ., Holston Mtn near Backbone Rock	Leaf litter, deciduous forests	S	G2
2a	*Gomphus consanguis*	Cherokee clubtail	Known from at least one occurrence in 6 states: VA, NC, SC, TN, GA, AL; 15 known occurrences	2 occ. (TDEC records); known from Polk and Sullivan Counties	Small, spring-fed streams, mod to high gradient	S	G3
1a	*Gomphus viridifrons*	Green-faced clubtail	Known from 16 states and 1 Canadian province with as many as 6 occurrences in some states; some populations are protected from habitat degradation	1 occ. Chestoa, Nolichucky R. 2001	Small-large rivers, moderate gradient	S	G4
2a	*Macromia margarita*	Mountain river cruiser	Known from at least one occurrence in 6 states: VA, NC, SC, TN, GA, AL; at least 13 occurrences; occurs in Blount Co., TN	0 occ.	Small streams to large rivers, rocky with silt deposits	S	G3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	*Megaleuctra williamsae*	Smokies needlefly	Known from at least one occurrence in 4 states: VA, NC, SC, TN; at least 3 occurrences in VA; known from Mt. Rogers & GSMNP	0 occ.	Springs and seeps at high elevations (>4000 feet).	S	G2
1a	*Ophiogomphus incurvatus alleghaniensis*	Allegheny Snaketail	Known from at least one occurrence in 4 states: WV, VA, TN, AL; at least 5 occurrences in TN; considered a subspecies of O. incurvatus by some.	2 occ. Monroe, Polk Cos. (TDEC records)	Spring-fed Piedmont streams	S	G3T2T3
1a	*Ophiogomphus edmundo*	Edmund's snaketail	Known from at least one occurrence in 3 states: TN, NC, GA; probably restricted to the Conasauga River in TN	1 occ. Conasauga R.	Large streams, low gradient, low elevation	S	G2
1a	*Ophiogomphus incurvatus*	Appalachian snaketail	Known from at least one occurrence in 4 states: PA, TN, NC, GA	1 occ Sheeds Cr #1	Small streams, low gradient	S	G3
4a	*Speyeria diana*	Diana fritillary	WV to AL	39 TDEC records, Monroe, Cocke, Greene, Carter, Johnson, Sullivan, Unicoi, Washington Cos.	Mature mesic forests, edges & grassy openings; caterpillar host is Viola sp.	S	G3G4
Mammals							
6a	*Corynorhinus rafinesquii*	Rafinesque's big-eared bat	OH to MO, south to FL and LA; OK, TX	2 TDEC records; Cocke & Monroe Cos.	Caves & mine portals; summer roosts in hollow trees, under loose bark, & abandoned buildings; forages primarily in mature forest	S	G3G4
1a	*Microtus chrotorrhinus carolinensis*	Southern rock vole	Mountains of MD, NC, TN, VA, WV	0 TDEC records; likely Monroe, Carter, Unicoi Cos.	Cool, damp coniferous and mixed forest; moist/mossy talus and logs at higher elevations	S	G4T3
6a	*Myotis leibii*	Eastern small-footed bat	ME to OH south, from SC to AL; AR, MO, OK; CAN: ON, QC	18 TDEC records, Polk, Monroe, Cocke, Greene, Unicoi, Carter, Johnson, Sullivan Cos.	Bridges, cliffs, mine portals, buildings; summer roosts buildings, hollow trees, loose bark	S	G3
2a	*Sorex palustris punctulatus*	Southern water shrew	Mountains of MD, NC, PA TN, VA, WV	4 TDEC records Monroe Co.	Swift rocky streams in northern & cove hardwoods; often hemlock, mossy rocks, rhododendron; riparian dependent	S	G5T3
Mussels							
1a	*Fusconaia barnesiana*	Tennessee pigtoe	H, LT, N, FB, W, SH	2 occ Hiwassee R. #4 & #5; LT habitat is inundated by Tellico Res.	Small to medium rivers, moderate to high gradient, low elevation	S	G2G3
1a	*Lasmigona holstonia*	Tennessee Heelsplitter	H, FB	1 occ Hiwassee R #4	Small streams to small rivers, low to moderate gradient, low elevation	S	G3
1a	*Lasmigona subviridis*	Green floater	W	0 occ	Large streams to small rivers, low gradient, low elevation	S	G3
1a	*Lexingtonia dolabelloides*	Slabside pearlymussel	H,N,FB,P,LT	2 occ Hiwassee R. #4 & #5	Small streams to large rivers, moderate to high gradient, low elevation	S{C}	G2
1a	*Pleurobema oviforme*	Tennessee clubshell	H,SH,FB,N,LT	3 occ Hiwassee R #4 & #5; Citico Cr #1	Large streams, low gradient, low elevation	S	G2G3
1a	*Strophitus connasaugaensis*	Alabama creekmussel	C	2 occ. Conasauga R #1 & #2	Large streams, low gradient, low elevation	S	G3
1a	*Villosa nebulosa*	Alabama rainbow	C	2 occ. Conasauga R #1 & #2	Large streams, low gradient, low elevation	S	G3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	*Villosa vanuxemensis umbrans*	Coosa creekshell	C	2 occ. Conasauga R #1 & #2	Small and large streams, low gradient, low elevation	S	G4T2
Snails							
1a	*Pallifera hemphilli*	Black mantleslug	MI, NC, TN, GA,VA	0 TDEC records; Field Museum & CNF records Polk (2), Carter (5) Cos.	Spruce fir and mesic forests with moist litter, downed wood and rock cover; high elevation	S	G4
6a	*Paravitrea placentula*	Glossy supercoil	VA, TN, NC, KY, GA Off-forest Cocke Co.; unk location Sullivan Co.	0 TDEC records; Field Museum & CNF records Polk(4), Monroe(2), Carter(2), Unicoi(1) Cos.	Leaf litter of deciduous forests and streamside forests with moist litter, downed wood & rock cover.	S	G3
1a	*Patera archeri*	Ocoee covert	Polk County , TN	4 CNF records Polk County	Leaf litter under rock ledges in ravines; Ocoee River drainage endemic	S	G1
6a	*Ventridens coelaxis*	Bidentate dome	NC, TN, KY, VA Off-CNF & unk locations Carter, Johnson, Sullivan Cos.; Unicoi Co.	Field Museum & CNF records; Unicoi (1), Carter (5) and Johnson (3) Cos.	Mesic deciduous forest, mid-high elevation	S	G3
6a	*Vertigo bollesiana*	Delicate vertigo	ME south to TN, NC (17 states, 3 Canadian provinces)	2 records Monroe Co.; 1 Field Museum record Johnson County	Rocky habitats in rich coves, acidic coves, other deciduous forests with downed wood	S	G4
6a	*Vertigo clappi*	Cupped vertigo	KY, TN, VA, WV	5 TDEC records Monroe Co.; TDEC record Carter Co.	Cool, wooded, mesic bedrock, out crops and cliffs	S	G1G2
Non-vascular Plants							
7a	*Acrobolbus ciliatus*	A liverwort	Mountains of NC, TN, SC, GA. AK, Japan, Taiwan, and India. Monroe Co.	1 Record	On rock in moist ravines, spray cliffs, cascading streams, and spruce/fir forests; Riparian dependent except when in the spruce/fir forest zone.	S	G3?
7a	*Aneura maxima (=A. sharpii)*	A liverwort	Mountains of VT, south to NC and TN	1 Records	Humus or gravelly soil at base of wet outcrops, along streams, and waterfalls. Mostly riparian dependent	S	G1G2
7a	*Aspiromitus appalachianus*	A hornwort	TN, NC, SC	Undocumented records have been reported.	On rock in streams. Riparian dependent.	S	G1
7a	*Bartramidula wilsonii*	Dwarf apple moss	Macon & Jackson Counties, NC and Monroe County, TN	0 Records. Known from Monroe County however site is undocumented.	Wet, acidic rock in the mtns, especially road cuts. Also on spray cliffs and in humid gorges. Mostly riparian dependent.	S	G3?
1a	*Bazzania nudicaulis*	A liverwort	Mountains of VA, TN, and NC	2 locations; Roan Mountain	On rock and bark of *Abies fraseri, Picea rubens, Betula lutea, Prunus pennsylvanica,* and *Sorbus americana* in spruce/fir forests.	S	G2G3
1a	*Brachydontium trichodes*	Peak moss	Europe, Mount Rainier, NH, NC, and TN	Unknown # on Roan Mountain	Moist, shady, acidic rock, especially sandstone; rocky seepage along mountain trails.	S	G2
7a	*Buxbaumia minakatae*	Hump-backed Elves	Nova Scotia, MA, NY, MI, VT, VA, NC and Japan	0 Records	Swampy areas; habitats occupied by *Nowellia, Lophocolea*, and *Tetraphis;* rotten logs or stumps; found on elm, ash and yellow birch logs.	S	G2G3
7a	*Cephalozia macrostachya ssp australis*	A liverwort	NC to MS	0 Records	On soil in rock crevices along streams. Riparian dependent.	S	G4T1
1a	*Cephaloziella massalongi*	A liverwort	Europe, VT, TN, and NC	0 Records	Rock crevices and soil above 5,500'. Often with copper or sulphur deposits.	S	G2G3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	*Cheilolejeunea evansii*	A liverwort	NC, SC, AL, and TN. Monroe Co.	1 Record	On tree bark in humid gorges. Variety of mesic to dry-mesic hardwoods including *Quercus* spp., *Liriodendron tulipifera, Nyssa sylvatica, Carya* spp., *Liqyuidambar styraciflua, Fraxinus* spp., and *Ilex opaca*. The moss *Fissidens subbasilaris* is nearly a constant associate.	S	G1
7a	*Chiloscyphus appalachianus*	A liverwort	KY, NC, SC, and TN. Monroe Co.	1 Record	On wet rock, usually near cascades or waterfalls. Riparian dependent.	S	G1G2
7a	*Diplophyllum apiculatum var taxifoliodes*	A liverwort	NC, TN The variety *taxifolioides* is known from several locations in NC and from Mt. LeConte in TN.	0 Records.	On moist soil or rocks at moderate to high elevations. *Diplophyllum* collected below 3,000 feet is likely to be *D. apiculatum* (Hicks 1992*)*. The variety is thought to be a hybrid of *D. apiculatum* and *D. taxifolioides* (Shuster 1974).	S	G5T1Q
1a	*Diplophyllum obtusatum*	A liverwort	Newfoundland, MN, mountains of NC & TN	0 Records.	In crevices of rock outcrops in spruce/fir forests; >5,500 ft. Always associated with damp, shaded rocks. It is also known to occur within mixed mesophytic forest in NC (Shuster 1974).	S	G2?
7a	*Ditrichum ambiguum*	A moss	CA, MT, NC, NH, NY, OR, VT, WA; BC, QC, SK	0 Records.	On bare soil of moist banks of roads or streams in wooded, upland, or montane habitats. Also acidic coves.	S	G3?
7a	*Drepanolejeunea appalachiana*	A liverwort	Mountains of VA, TN, NC, SC, and GA; PR	4 Records.	On rock and the bark of trees and shrubs along streams, mixed mesophytic forest, and in humid gorges. Most often found on *Kalmia Rhododendron, Clethra,* and *Ilex.* Substrates for the CNF pops include rock, *Quercus alba*, and *Betula allegheniensis.*	S	G2?
7a	*Entodon concinnus*	Lime entodon	NC, TN; AB, BC, NS	0 Records.	On moist calcareous rock.	S	G4G5
7a	*Fissidens appalachensis*	Appalachian pocket moss	NC and TN. Monroe Co.	1 Record.	In rock crevices submerged in swift running, shallow water. Riparian dependent.	S	G2G3
7a	*Frullania appalachiana*	A liverwort	Mountains of TN, NC, GA, and SC	1 Record.	Usually on the bark of hardwoods (*Acer spicatum, Betula allegheniensis, Sorbus americana*) above 3,500 ft. in spruce/fir zone. Also known from mesic forests and escarpment gorges on the bark of *Castanea dentata* and *Liriodendron tulipifera*.	S	G1?
1a	*Frullania oakesiana*	A liverwort	Northern Europe, Japan, and Mountains of VT to NC and TN	0 Records.	Tree bark in spruce/fir forests.	S	G3?
7a	*Homaliadelphus sharpii*	Sharp's homaliadelphus	Japan, Vietnam, Mex; MO VA, NC, and TN	0 Records.	Vertical surfaces and ledges of calcareous cliffs and boulders. Dry mafic or calcareous rocks in gorges.	S	G3
7a	*Hydrothyria venosa*	An aquatic lichen	CA to MT and Canada; Appalachians from Canada to TN & NC. Monroe Co.	1 Record	On rock substrates in clear, cold mountain streams. Riparian dependent.	S	G3
7a	*Lejeunea blomquistii*	A liverwort	Mountains of NC, TN, and GA. Monroe Co.	2 Records.	Rock and bark in humid gorges, and dead trees or vertical rock faces of spray cliffs.	S	G1G2
1a	*Lejeunea dimorphophylla*	A liverwort	The Caribbean; coastal plain of FL and NC	This has proven to be *Lejeunea ulicina* ssp. *bullata*.	On bark of trees in the outer coastal plain. Riparian dependent.	S	G2G3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	*Leptodontium excelsum*	Grandfather Mountain leptodontium	VA, TN, NC, and GA	Unknown # on Roan Mountain	Bark of trees in high elevation, spruce/fir forests.	S	G2
7a	*Leptohymenium sharpii*	Mount LeConte moss	TN, NC, and SC	0 Records.	On shaded, moist or wet rock (often cliffs and waterfalls) and within hemlock/hardwood cove forests. Elevation ranged from 1900- 5400'.	S	G1
7a	*Lophocolea appalachiana*	A liverwort		see Chiloscyphus appalachianus	See Chiloscyphus appalachianus	S	G1G2?
7a	*Marsupella emarginata var. latiloba*	A liverwort	Range unknown	0 Records.	Moist rocks in humid gorges, waterfall spray zones, wet rock & seeps along streams, or humid microclimates at high elevation. Riparian dependent.	S	G5T1T2
7a	*Megaceros aenigmaticus*	A hornwort	NC, TN, and GA. Monroe and Cocke Co's.	31 Records (often abundant in areas where found).	Shaded rocks in small streams and springs, or spray cliffs. Riparian dependent.	S	G2G3
7a	*Metzgeria fruticulosa (= M. temperata)*	A Liverwort	Asia, Europe; PNW US; VA, NC, and TN	Undocumented Record, Roan Mountain	Rock and bark of trees from spruce/fir zone to hemlock/hardwood forests above 3000'.	S	G2Q
7a	*Metzgeria furcata var. setigera*	A liverwort	NC and SC, possibly TN	0 Records.	In humid gorges or on damp, shaded rocks in spruce/fir forests.	S	G4T1
7a	*Metzgeria uncigera*	A liverwort	PR; SE coast to mountains of NC	0 Records.	On *Rhododendron* bark in mountains.	S	G3
7a	*Nardia lescurii*	A liverwort	VA, WV, KY, TN, NC, SC, and GA. Monroe Co.	3 Records	Low elevations in mountains, on peaty soil over rock near shaded streams. Riparian dependent.	S	G3?
7a	*Pellia appalachiana*	A liverwort	MN, NC, SC, TN, and GA. Monroe and Polk Co's.	3 Records.	Permanently damp or wet sites and moist outcrops, usually near waterfalls. Mostly riparian dependent	S	G1?
7a	*Plagiochila austinii*	A liverwort	NH and VT to NC and TN	0 Records.	On shaded, moist rock outcrops in the mountains	S	G3
7a	*Plagiochila caduciloba*	A liverwort	Mountains of TN, NC, SC, and GA. Monroe Co. (Historic record from Greene County)	2 Records.	Damp, shaded rock faces, usually along streams in mountain gorges and on spray cliffs; 1000-4900 ft. Riparian dependent.	S	G2
7a	*Plagiochila echinata*	A liverwort	Mountains of TN, NC, and SC. Monroe and Polk Co's.	5 Records.	Damp, shaded rock faces and crevices in mountain gorges, above cascades and near waterfalls. Riparian dependent.	S	G2
7a	*Plagiochila sharpii*	Sharp's leafy liverwort	TN, NC, SC, and GA	0 Records.	Shaded, moist rocks in humid gorges. Riparian dependent.	S	G2G3
7a	*Plagiochila sullivantii var spinigera*	A liverwort	Mountains of VA, WV, NC, SC, and TN. Monroe Co.	1 Record.	Moist, shaded rock outcrops, under cliff ledges, and in rock crevices; spray cliffs and spruce/fir forests; > 2500 ft.	S	G2T1
7a	*Plagiochila sullivantii var sullivantii*	Sullivant's leafy liverwort	Mountains of VA, WV, KY, TN, NC, SC, and GA. Monroe Co.	1 Record.	Moist, shaded rock outcrops, cliff ledges and rock crevices; spray cliffs and spruce/fir forests; > 2500 ft.	S	G2T2
7a	*Plagiochila virginica var caroliniana*	A liverwort	VA, NC, SC, and TN	2 Records, no varietal info.	On moist rock near waterfalls; humid gorges and rocky banks of shaded streams. Riparian dependent. Generally at lower elevations.	S	G3T2
7a	*Plagiochila virginica var virginica*	A liverwort	WV, to NC, SC, TN, GA, and MS	2 Records, no varietal info.	On shaded rock along streams and moist rock faces, especially limestone. Riparian dependent. Generally at lower elevations.	S	G3T3

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	*Plagiomnium carolinianum*	Carolina plagiomnium	TN, NC, SC, and GA	0 Records.	Moist, granitic or humus covered rock, especially on cliff ledges near streams or waterfalls; rocks or streambanks in humid gorges. Riparian dependent.	S	G3
7a	*Platyhypnidium pringlei*	A moss	Mexico, AZ; NC, SC, and suspected in TN	0 Records.	Attached to acidic rock in running water, permanent seeps, or spray cliffs of waterfalls in hemlock/hardwood forests. Riparian dependent.	S	G2
1a	*Polytrichum appalachianum*	Appalachian haircap moss	TN and NC	0 Records.	High elevation rocky summits, rock outcrops, and shrub balds.	S	G3
7a	*Porella wataugensis*	Watauga porella	KY, TN, NC, and SC. Monroe Co.	3 Records	Rock faces in humid gorges & wet rock near small streams above inundation. Riparian dependent.	S	G2
7a	*Radula sullivantii*	A liverwort	Mountains of NC, SC, TN, and GA	1 Record.	Shaded rock outcrops near streams and waterfalls in mountain gorges. Riparian dependent.	S	G2
7a	*Radula voluta*	A liverwort	Europe, South America; mountains of NC and TN. Monroe Co.	1 Record	Shady rock faces in spray areas around waterfalls. Riparian dependent.	S	G3
7a	*Riccardia jugata*	A liverwort	Mountains of NC and TN. Monroe and Polk Co's.	3 Records.	On moist wood and humus in mesic areas and humid gorges.	S	G1G2
1a	*Sphenolobopsis pearsonii*	A liverwort	Europe, Africa, Asia, Atlantic and Pacific Islands, Pacific NW; NC and TN	Roan Mountain (Undocumented)	On rock and bark of *Abies fraseri, Picea rubens, Prunus pennsylvanica,* and *Sorbus americana* in spruce/fir forests.	S	G2
7a	*Sticta limbata*	A foliose lichen	Canada to CA; mountains of NC and TN	0 Records.	Bark of hardwoods in high elevation northern hardwood forests	S	G3G4
7a	*Taxiphyllum alternans*	Japanese yew-moss	Asia; MD to FL, NC, and LA	0 Records.	Soil, humus, or bark in wet, swampy areas; on limestone in the spray area of waterfalls. Riparian dependent. .	S	G3?
7a	*Tortula ammonsiana*	Ammons' tortula	Africa; WV, NC, and TN	0 Records.	Cliff overhangs and crevices with seepage in rich hardwood forests. Riparian dependent.	S	G2?
Vascular Plants							
7a	*Aconitum reclinatum*	Trailing white monkshood	South and central mountains of NC, PA, TN, VA, WV. Carter Co.	1 Record.	Rich forest habitats on seepage slopes, boulderfields, streambanks, and coves at high elevations, associated with mafic rock.	S	G3
1a	*Aster georgianus*	Georgia aster	AL, FL, GA, NC. Suspected in SE TN	0 Records	Dry, rocky, open woods and roadsides in areas with a history of frequent fire; Likely associated with historic post or blackjack oak woodlands.	S	G2G3
7a	*Berberis canadensis*	American barberry	PA to IL, south to AL, GA; IL, MO. Monroe, Johnson, Sullivan, Washington, Carter, and several ridge and valley counties.	0 Records	Open rocky woods, openings, and streambanks, usually over mafic or calcareous rock; occurring in thin soil. Historic habitats were fire maintained.	S	G3
7a	*Botrychium jenmanii*	Dixie grapefern	MD to FL; TN, AL, MS, LA. Monroe, Hamblen, Putnam Co's.	0 Records	Dry to moist forests; open, grassy areas; and disturbed areas.	S	G3G4
7b	*Buckleya distichophylla*	Piratebush	Mountains of NC, TN, VA. Carter, Cocke, Greene, Sullivan, Unicoi, Washington Co's.	14 Records.	Open, dry, rocky woods and bluffs, typically calcareous-shaley soils; Known sites occur between 1900-3300 ft.	S	G2
7a	*Calamagrostis cainii*	Cain's reed grass	Mountains of NC, TN. Sevier Co.	0 Records	High elevation rocky summits and disturbed areas 4000-6000 ft.	S	G1

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	*Cardamine clematitis*	Small mountain bittercress	Mountains of AL, NC, SC, TN, VA. Carter, Johnson, Unicoi, Washington, Monroe, Sevier Cos.	13 Records	Wet, rocky areas; springs, seeps, and streambanks; moss or moist soil; > 3,500'; Mostly riparian dependent.	S	G2G3
7a	*Carex misera*	Wretched sedge	Mountains of GA, NC, TN. Blount, Sevier, Carter, Unicoi	3 Records	Medium to high elevation cliffs, balds and rocky areas	S	G3
7a	*Carex roanensis*	Roan sedge	GA, KY, NC, TN, VA. Carter, Johnson, Unicoi, Cocke, Sullivan	37 Records	Mesic forests; often associated with birch and beech at high elevations.	S	G1
7a	*Cimicifuga rubifolia*	Appalachian bugbane	AL, IL, IN, KY, TN. Monroe, Sullivan, & several Ridge and Valley cos.; Primary Cumberland Plateau in TN.	0 Records	River bluffs, ravines, and rich cove forests over talus and rocky calcareous soils; typically north facing slopes; 800-1500 ft.	S	G3
7a	*Collinsonia verticillata*	Stoneroot	MD to GA; OH, KY, TN. Monroe, McMinn, Blount, Sevier, Johnson, and several counties to west.	3 Records	Rich forests in moist coves to dry oak forests over mafic or calcareous rock.	S	G3
7a	*Coreopsis latifolia*	Broadleaf tickseed	Mountains of GA, NC, SC, TN. Polk, Carter, Greene	6 Records	Rich, moist cove and slope forests 1,500 to 4,500 ft. Flowering triggered by canopy gaps.	S	G3
7a	*Danthonia epilis*	Bog oat-grass	GA, NC, NJ, SC, TN. Cocke	0 Records	Seeps around rock outcrops in the mountains. Riparian dependent.	S	G3?
7a	*Delphinium exaltatum*	Tall larkspur	OH, PA south to TN, NC; AL, MO, ME. Mostly Ridge and Valley Co's, but reported from Cocke Co.; Known from the Blue Ridge in NC.	0 Records;	Dry to moist habitats over mafic rock, usually in full or partial sun (grassy balds or forest edges). Also rich woods (and edges of woods), rocky slopes, semi-open woodlands, glades and prairie openings.	S	G3
7a	*Diervilla rivularis*	Riverbank bush-honeysuckle	Mountains of AL, GA, NC, TN. Unicoi, Washington, Polk, and some Ridge and Valley Co's.	12 Records	Bluffs, rock outcrops, and riverbanks	S	G3
7a	*Fothergilla major*	Large witchalder	AL, AR, GA, NC, SC, TN. Polk, Sevier, Greene, and some west of Blue Ridge	3 Records	Dry ridge top and bluff forests of moderate elevations.	S	G3
7a	*Gentiana austromontana*	Appalachian gentian	Mountains of NC, TN, VA, WV. Carter, Greene, Johnson, Sullivan, Unicoi, Washington Cos.	88 Records	High elevations in open forests, grassy balds, and along roads and trails.	S	G3
7a	*Geum geniculatum*	Bent avens	Mountains of NC, TN. Carter Co.	10 Records	High elevation peaks, seeps, wet boulderfield forests, grassy balds, cliff bases, and stream banks.	S	G2
7a	*Glyceria nubigena*	Great Smoky Mountain mannagrass	Mountains of NC, TN. Sevier.	0 Records	Moist to soggy ground at higher elevations, especially seepage areas on heath balds and high ridges and miry places in spruce-fir forests	S	G2
7a	*Helianthus glaucophyllus*	Whiteleaf sunflower	AL, NC, SC, TN. Carter, Greene, Johnson, Unicoi Cos.	13 Records	Mesic forests and woodlands at medium elevations. Flowering associated with increased light.	S	G3
7b	*Heuchera longiflora var. aceroides*	Maple-leaf alumroot	Range for H. longiflora is AL, KY, NC, OH, TN, VA, and WV. No published range info for variety. Cocke, Greene Cos.	11 Records	Moist ravines and rich cove forests, especially over mafic or calcareous rock.	S	G4T2Q

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	*Hymenophyllum tayloriae*	Taylor's filmy fern	NC, SC, TN, GA. Sevier, Fentress, Overton.	0 Records	Humid gorges, moist ceilings of rock grottoes and spray cliffs. Riparian dependent.	S	G1G2
7a	*Hypericum graveolens*	Mountain St. Johnswort	Mountains of NC, TN. Sevier, Unicoi, Carter, Johnson.	3 Records	High elevation grassy balds and forest openings.	S	G3
7a	*Hypericum mitchellianum*	Blue Ridge St. Johnswort	Mountains of NC, TN, VA, WV. Unicoi, Carter, Cocke, Greene, Johnson, Sevier, Blount, Monroe.	9 Records	Grassy balds, seeps, and forest openings.	S	G3
7a	*Ilex collina*	Longstalked holly	NC, VA, WV. Suspected in TN	0 Records	Wetlands, seeps, or streambanks >2,000 ft. often in association with *Tsuga canadensis, Betula lenta, Ilex montana, Picea rubens*, and *Rhododendron maximum*. Also moist, rocky slopes in northern hardwood or mixed spruce/hardwood forests.	S	G3
7a	*Juglans cinerea*	Butternut	Central and eastern US and southeastern CAN. All Blue Ridge counties and scattered throughout TN.	15 Records	Moist, rich forests especially along rivers in bottomlands and floodplains.	S	G3G4
7a	*Lilium grayi*	Gray's lily	Mountains of NC, TN, VA. Carter and Johnson Co's.	6 Records	Bogs, seeps, grassy balds, moist forest edges, and wet meadows at medium to high elevations.	S	G3
7a	*Lysimachia fraseri*	Fraser's yellow loosestrife	Regional endemic of AL, GA, NC, SC, TN; KY, IL. Polk, Sevier, Cocke, Hamilton, and a few counties in west TN.	10 Records	Forest edges, road banks, Along streams and rivers, and thin soil near rock outcrops. Locally abundant in the Ocoee River Gorge. Dependent upon cyclical natural disturbances to maintain open conditions.	S	G2
7a	*Minuartia godfreyi*	Godfrey's stitchwort	Regional endemic AL, AR, FL, NC, SC, TN. Carter, Johnson.	0 Records	Wet ditches, meadows, seeps, streams banks, and springs; associated with calcareous soils. Riparian dependent.	S	G1
7a	*Monotropsis odorata*	Sweet Pinesap	DE to FL, AL, KY, TN, WV; Centered in Appalachians. Polk, Monroe, Blount, Sevier, Cocke, Greene, and a few counties west.	10 Records	Dry to mesic pine and mixed pine/hardwood forests.	S	G3
7a	*Penstemon smallii*	Small's beardtongue	Mountains of AL, GA, NC, SC, TN. Polk, Cocke, Greene, Washington, Unicoi, Carter, and several counties west.	0 Records	Woodlands, cliffs, glades, and roadsides.	S	G3
1a	*Platanthera integrilabia*	White fringeless orchid	VA to GA, KY to AL, MS. Polk, Monroe and several Cumberland Plateau counties	2 Records	Forested wetlands with open or semi-open canopy. Wet, flat, boggy areas at the head of streams or seepage slopes. Often found in association with *Sphagnum* and *Osmunda cinnamonea, Woodwardia areolata*, and *Thelyptris novaboracensis,* in acidic muck or sand, and in partially, but not fully shaded areas.	S	G2G3
1a	*Potamogeton tennesseensis*	Tennessee pondweed	OH, PA, TN, VA, WV. Polk, Monroe, Blount and counties west	1 Record	Slow moving streams and rivers. Riparian dependent.	S	G2

PRC*	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	*Prenanthes roanensis*	Roan Mountain rattlesnake root	Mountains of NC, TN, VA. Polk, Sevier, Greene, Unicoi, Carter, Johnson	48 Records	High elevation rich woods, grassy balds, and forest openings.	S	G3
7a	*Pycnanthemum beadlei*	Beadle's mountain mint	Mountains of southwest VA to GA, TN. Carter	0 Records	Forests and woodland borders.	S	G2G4
7a	*Rosa obtusiuscula*	Appalachian Valley rose	TN endemic. Only known collection from Cocke Co.	0 Records; not tracked by TDEC; NY Botanical Garden Database lists one record (1897) in Cocke County near French Broad River between Paint Rock and Del Rio.	Listed by TN Natural Heritage (1999) as a rare endemic, known from wooded slopes and riverbanks. Taken off after Rare Plant Advisory Committee meeting (1999) until taxonomic issues are resolved. It could be *Rosa palustris*. At this point it is considered to be "State Historic".	S	G1G3Q
7a	*Rugelia nudicaulis*	Rugel's Indian plantain	Mountains of NC, TN. Cocke, Sevier, Blount	0 Records	Spruce/fir and northern hardwood forest openings	S	G3
7a	*Saxifraga caroliniana*	Carolina saxifrage	Mountains of GA, NC, TN, VA, WV. Carter, Cocke, Johnson Cos.	4 Records	Moist rock outcrops and cliffs; wet soil at the base of rocks; cool, shaded, rocky woods. Almost always in steep terrain and often in areas misted by spray from nearby waterfalls or in areas where water trickles down the rocky slopes.	S	G2
7a	*Scutellaria arguta*	Hairy skullcap	GA, KY, NC, TN, VA. Unicoi	0 Records	High to mid elevation forests and moist talus slopes	S	G2?Q
7a	*Scutellaria saxatilis*	Rock skullcap	CT to IN, south to AL, GA, SC, AR. Polk, Blount, Unicoi, Carter, Johnson, Cocke, Greene	49 Records	Rocky, dry to mesic forests and open areas	S	G3
1a	*Sedum nevii*	Nevius' stonecrop	AL, GA, TN. Polk	9 Records all restricted to the Ocoee River Gorge.	Shaded, rocky bluffs and cliffs	S	G3
7a	*Sida hermaphrodita*	Virginia fanpetals	KY, MD, OH, PA, TN, VA, IN, MI, Ontario. Cocke, Washington, Claiborne	0 Records	Sandy or rocky riverbanks	S	G2
7a	*Silene ovata*	Blue Ridge catchfly	AL, AR, GA, IL, IN, KY, MS, NC, SC, TN, VA. Polk, Sevier, Cocke, Greene, Unicoi and west.	4 Records	Mid elevations over mafic or calcareous soils. Rich cove and oak/hickory forests.	S	G2G3
7a	*Stachys clingmanii*	Clingman's hedge-nettle	AL, IN, MD, NC, SC, TN, WV. Monroe, Sevier, Blount, Cocke, Unicoi	10 Records	Rich boulderfields, cove, northern hardwood, and spruce/fir forests, and clearings at high elevations.	S	G2Q
7a	*Thaspium pinnatifidum*	Cutleaved meadow parsnip	AL, GA, KY, NC, OH, TN, VA. Greene, Cocke, Hamilton	1 Record	Forests and woodlands over calcareous rock	S	G3?
7b	*Thermopsis mollis var. fraxinifolia*	Ashleaf goldenbanner	Mountains of GA, NC, SC, TN; AL. Polk, Monroe, Blount, Greene	29 Records	Openings and ridges in dry woodlands. Often on road banks.	S	G4? T3?
7a	*Trillium rugelii*	Southern nodding trillium	Mtns & Piedmont of AL, GA, NC, SC, TN. Carter, Cocke, Unicoi, Washington, Polk, Blount, Sevier	6 Records	Rich forests and coves often over mafic or calcareous substrates.	S	G3
7a	*Trillium simile*	Sweet white trillium	Mountains of GA, NC, SC, TN. Polk, Monroe, Sevier, Blount, Cocke	Several Records, not in database.	Rich soils of slopes or coves over mafic or calcareous rock.	S	G3
7a	*Tsuga caroliniana*	Carolina hemlock	Mountains of GA, NC, SC, TN, VA. Carter, Johnson, Sullivan, Unicoi, Washington	56 Records	Ridge tops, rocky bluffs and open forests. Generally dry conditions.	S	G3

ATTACHMENT B

List for determining the Project Review Code (PRC) for each TES Species

Last changed 5/9/08 MSC

1a: Project is located out of the species known range, or suitable habitat does not exist in the project area.

Determination of Effect: No Impact.

2a: All requisite habitat has been identified and excluded from disturbance associated with the project. Therefore, the project is expected to have no effects regardless of the number and location of individuals in the area affected by the project.

Determination of Effect: No Impact.

3a: The project is being implemented for the benefit of the species, and is expected to have totally beneficial effects regardless of the number and location of individuals in the area affected by the project.

Determination of Effect: Beneficial effect.

4a: It is assumed that the species is present. Additional information on the number and location of individuals is not needed to improve the design and/or application of mitigation to reduce adverse effects, or to allow a better assessment of effects to viability of the population.

5a: The species is already covered by a current site-specific inventory for the project area and additional inventories are not needed.

6a: Inventory methods are not technically or biologically feasible and effective for providing substantial information on the number and location of individuals. It is assumed that the species is present.

7a: A site-specific inventory was conducted, but the species was not found in the project area.

Determination of Effect: No Impact.

7b: A site-specific inventory was conducted, and the species was found in the project area.